**Revised July 25, 2013**

# 2013 MOURNING DOVE POPULATION AND RESEARCH STATUS REPORT

Thomas G. Kulowiec
Administrative Coordinator

Ron Reitz
Survey Coordinator

Julie Fleming
Database Manager

## Migratory Bird Harvest Information Program (HIP)

The national migratory bird harvest information program (HIP) was developed to fill the need for reliable harvest data to guide management decisions for all migratory game birds in addition to numerous post-season mail harvest surveys conducted by individual states. Although federal waterfowl harvest surveys existed since 1952, historical surveys lacked a reliable sampling frame of names and addresses of all migratory bird hunters and, therefore, did not adequately address webless migratory game birds (e.g., mourning doves, woodcock). Since 1998, the HIP harvest survey has provided reliable estimates of hunter activity and harvest at national and regional scales for all migratory game bird species, and provides comparable harvest estimates at the state scale.

During the 2012-13 mourning dove season, as estimated by the HIP survey, Texas led the Central Management Unit (CMU; Figure 1) in mourning dove harvest with 4.2 million birds killed by 207,200 dove hunters (Table 1). During 2012-13, Missouri was fourth in CMU mourning dove harvest with 296,600 doves killed by 23,800 dove hunters; Arkansas was second, Oklahoma was third and Kansas was fifth in harvest (Table 1).

## Missouri's Small Game Post-season Harvest Survey

Starting in 2009, it was decided that the Small Game Post-season Harvest Survey would be conducted every two years instead of annually. It was felt that annual differences were not as critical to decision making as the long term trends and that auxiliary sources of data (such as the road side surveys and selected area harvest checks for doves) would adequately supplement information collected from a biennial small game survey. A survey was conducted in 2012 and preliminary results from this survey are presented below.

Harvest data for Missouri during 2012 showed 27,975 mourning dove hunters harvested 500,585 doves statewide; a 9.0% decrease in hunters and a 5.5% decrease in harvest from 2010. Statewide, dove hunters averaged 4.2 doves per day and 4.3 days of hunting per season in 2012 compared to 3.8 doves per day and 4.2 days per season in 2010. Average season bag for 2012 was 17.9 mourning doves compared to 15.6 in 2010. Data for 2012, by zoogeographic region, showed Mississippi Lowlands and Northeastern Riverbreaks with the largest harvests (140,024 and

102,938 doves, respectively) and Northern Riverbreaks with the lowest (13,520 doves; Figure 2).

Long-term trends of harvest and hunters continue to show relative declines (Figure 3), with daily bag and average days afield staying relatively stable the last few years (Figure 4). Although the number of hunters and harvested doves has declined since the 1970s, remaining dove hunters are hunting about the same number days, while gradually increasing their daily harvest.

## 2013 MOURNING DOVE POPULATIONS TRENDS/SURVEYS

The Department annually conducts two mourning dove surveys in Missouri, the National Mourning Dove Call-Count Survey (CCS) and the Roadside Dove Survey (RDS). The CCS is a national survey conducted annually in cooperation with the states and the USFWS. The CCS was established in 1966, and currently surveys nearly 1,500 routes nationally. The CCS was established to provide regional and national population indices. In Missouri, the CCS provides an index of doves heard calling per mile along 20 standard routes. In addition to the CCS, the RDS is an independent survey conducted annually by Department staff; the survey contains usable data going back to 1948. The RDS provides an index of doves seen, rather than calling, along standardized routes throughout the state (some urban counties have been excluded through time because of traffic concerns). The RDS provides regional data for Missouri that the CCS cannot supply. There is a very strong long-term relationship between both surveys over several decades; however, it is not unusual for the two surveys to show relatively small opposite trends within a given year.

### 2013 National Mourning Dove Call-Count Survey

For Missouri, CCS log-linear hierarchical model fit using Bayesian methods between 2012 and 2013 showed no evidence of a change in abundance (estimated 2.6% decrease with a 95% credible interval of -19.1% to 18.0%; Figure 5). During the last 10-years (2004–2013), Missouri's CCS trend also showed no conclusive evidence about a change in abundance (estimated 1.4 % decrease with a 95% credible interval of -3.3% to 0.9%) per year. The long-term CCS trend for Missouri (1966–2013) does show evidence of a decline of 2.2% (95% credible interval of -2.9 to -1.6%) per year. In the 14 Central Management Unit (CMU; Figure 1) states, 2013 dove populations showed inconclusive evidence of a trend in abundance with an estimated increase of 0.4% but a 95% credible interval of -4.7% to 5.8% compared to 2012 indices. The relative trend of doves heard calling and trend of doves seen while conducting CCS routes in the CMU show different trajectories (Figure 6) lending suspicion to the value of the data in a harvest management decision-making process. This is one of the reasons why the interim mourning dove harvest management strategy and the evolving long-term harvest strategy will be based on vital rates derived from banding, harvest, and wing collection data starting in 2013.

### 2013 Missouri's Roadside Mourning Dove Survey

Statewide results of the 2013 RDS showed 1.40 doves/mile; an 18.31% decrease compared to 2012 (Figure 5), a 3.01% increase from the statewide 5-year average (2008-12; 1.36 doves/mile, SD 0.21), and a 1.57% increase from the statewide 10-year average (2003-12; 1.38 doves/mile, SD 0.17; Table 2). All zoogeographic regions except one, the Ozark Plateau, showed declines from the last year's observed upswing in the index (Table 2). By zoogeographic regions (Figure 2), Mississippi Lowlands had the highest index (5.02 doves/mile), and the North and Eastern Riverbreaks and Ozark Plateau the lowest (1.01 and 0.88 doves/mile, respectively; Table 2). Survey results are also provided by Department management regions (Figure 2; Table 2).

This year, the CCS index continued to show relatively small changes from the previous years as well as declines in 10-year and long-term averages (Figure 5). The RDS index showed small decreases compared to the previous year but still showed an increasing trend compared to the 5-year and 10-year averages (Table 2), indicating stable to slightly smaller population levels. Depending upon weather conditions the last week of August and early September and food availability to concentrate doves, hunting opportunities are anticipated to be average this dove season.

**Long-Term Population Trends**

Long-term mourning dove trends from both RDS and CCS surveys provide an interesting picture (Figure 5). Since 1966, both surveys show a strong relationship to each other ($r = 0.76$; 1966-2012). If we assume that these 2 surveys are tracking similar aspects of the mourning dove population, we see 3 things emerging from Figure 5. First, although trends have declined since 1966, the RDS trend has been relatively stable in the last 10 years. Second, although trends are lower today than during the late 1960s, RDS trends are near levels similar to the late 1940s and early 1950s. Third, some phenomena occurred during the late 1950s and early 1960s that caused trends to climb rapidly. Regionally, we can speculate that some beneficial and broad scale land use changes occurred in the Mississippi Lowlands, Northeast Riverbreaks, Northeastern Riverbreaks, and Western Prairie during the late 1950s and early 1960s (Figures 12–19). Regardless, the important point is that roadside trends are problematic at best when trends of similar variables contradict each other (Figure 6). Also, trends in such data change with no apparent explanation for the change.

From a national perspective, some uncertainty exists about the relative merits of the North American Breeding Bird Survey (BBS) and CCS surveys (i.e., CCS doves heard, and CCS doves seen), and the actual ability of the surveys to track real changes in mourning dove population trends. Although the CCS protocol is specifically designed for doves, the number of survey routes is less compared to the BBS, which leads to concerns about the sensitivity of the survey to detect trends. In addition, these trend declines may not be indicative of actual changes in populations, but rather an index to unmated males in the breeding population, changes in habitat along standardized survey routes, or a wide range of other factors. Although uncertain in some respects, these data provide a useful and generalized picture of relative population trends for use in providing regional and statewide hunting forecasts for Missouri. These uncertain data, however, show the need for improving the reliability of the information used in the harvest management decision making process (i.e., establishing and changing hunting regulations). This was the primary motivation for the establishment and approval of the Mourning Dove National Harvest Management Plan adopted by all flyway councils and the Association of Fish and Wildlife Agencies (AFWA), and the emerging and ongoing national mourning dove banding and wing collection programs.

## INTERIM MOURNING DOVE HARVEST MANAGEMENT STRATEGY FOR THE CENTRAL MANAGEMENT UNIT AND IMPACTS ON THE 2013 MOURNING DOVE HUNTING SEASON REGULATIONS

The hunting regulation for the 2013 mourning dove hunting season in Missouri is 15 birds per day during a 70–day season. Following is the rationale for the season structure and how the regulation decision is made. A change was made for this hunting season, by increasing the possession limit from 2-times (30 birds) to 3-times (45 birds) the bag limit. This change was made to increase

hunting opportunity for those hunters that may travel long distances to hunt. It is not anticipated this change will have any significant impact on harvest rates and/or total birds harvested.

As mentioned earlier, the future of dove management depends primarily upon harvest management and our understanding of how harvest affects dove populations. In other words, our primary explicit assumption is that doves are habitat generalists and that we believe changes at the macro-habitat level has minimal impact on abundance. Increasingly, there has been broad-scale support for improving the information used in the decision making process for mourning dove harvest management. In 2001, a National Mourning Dove Planning Committee was formed and developed a plan of action that would lead to guidelines that technical committees could use to prepare harvest management plans for their respective management units. The National Plan was approved by all 4 flyway councils in August, 2003. The plan outlined a new vision of information-based decision making compared to the status quo of singly relying on population trends from roadside indices. The USFWS Regulations Committee (SRC), however, requested the respective management unit technical committees develop an interim mourning dove harvest management strategy given available information (e.g., BBS and CCS indices). This request was based upon a perceived idea that the recently approved National Plan, although a step in the right direction, would not provide useful assistance in the harvest regulation process for several years.

The revised interim harvest management strategy provides guidelines for cooperative establishment of mourning dove hunting regulations in the Central Management Unit (CMU; Figure 1). This revised strategy is a transitional step towards implementation of the strategy envisioned in the **Mourning Dove National Strategic Harvest Management Plan**, and provides recourse in the event of large year-to-year changes in the mourning dove population. The composite trend models used as the basis of the strategy will be replaced by population models in ≤5-years, pending continued and expanded support for banding and wing survey programs, and research generating information for population models. This interim strategy, and subsequent strategies using population models, will fulfill requests by the USFWS for mourning dove harvest management strategies that use similar sources of data among dove management units.

The interim strategy presumes that regulatory decisions will be made based solely on composite population trends during a specified time frame. The composite trends will be estimated from four data streams: CCS-heard, CCS-seen, BBS, and population growth rates derived from banding and harvest data. It is assumed there are 3 regulatory alternatives, which are generically referred to as: 1) restrictive, 2) enhanced, and 3) standard. The simple idea is that if the composite trend is at or below some pre-determined lower threshold value with some specified level of statistical confidence, then regulations would be restricted. If the trend is at or above an upper threshold value with some specified level of statistical confidence, then regulations are liberalized. Current regulations will be maintained as moderate or standard packages if the trend is between the 2 thresholds. It is important to note that while these composite trends provide a decision making framework in the **interim**, they are largely uninformative to processes governing dove populations. That is, **the composite trend indices do not inform managers as to why the trend goes up or down, or the effects that harvest regulations have on population vital rates**.

Implementation of a decision framework requires specification of 6 parameters:

- time interval to generate indices,

- annual rate of change during the selected time interval that will trigger a liberalized harvest regulation (L),
- probability ($P_L$) that the trend estimate (T) is equal to or greater than L in the posterior probability distribution,
- annual rate of change during the selected time period that will trigger a restricted harvest regulation (R),
- probability ($P_R$) that the trend estimate (T) is less than or equal to R in the posterior probability distribution, and
- the number of years the regulatory package remains in place.

These criteria provide the flexibility to implement a wide spectrum of regulatory options accommodating a wide range of considerations. Following is a matrix showing the decision outcomes in the harvest regulation decision-making process. Simply stated, if the composite 5-year trend is significantly increasing we can anticipate a 22-bird daily bag with a 70-day season. If the trend is stable we would likely have a 15-bird daily bag with 70-days. If the trend is declining we would have an 8-bird daily bag. Regulations remain in effect for 3-years if a change occurs to evaluate impacts of the change; data analysis of trends occurs annually. Using data from 1980–2006 to determine if regulatory changes would have occurred in the past, we found that no regulation changes would have occurred based on the performance of the composite trend estimator.

| **Composite Population Trend** | **Estimated annual rate of change during a 5-yr interval** | **Proportion of Estimated Trend** | **CMU Daily Bag Limit** |
|---|---|---|---|
| $t > 0.00$ (increasing trend | $\hat{t}_L > 0.05$ | $P_L \geq 0.80$ | 22 (**enhanced**: 47% increase in bag limit, and an estimated 24% harvest increase) |
| $t = 0.00$ (stable trend) | $\hat{t}$ is between -0.05 and 0.05 | -- | 15 (**standard**: no change in bag limit) |
| $t < 0.00$ (declining trend) | $\hat{t}_R < 0.05$ | $P_R \geq 0.80$ | 8 (**restrictive**: 47% reduction in bag limit, and an estimated 24% harvest reduction |

## MONITORING DOVE SHOOTING FIELD MANAGEMENT

Mourning doves provide abundant hunting opportunities close to where urban residents live. Unlike other game animals that require relatively large areas of habitat management for hunting, mourning dove shooting field management routinely occurs on sunflower fields ranging in size from 5–30 acres. However, considerable uncertainty has existed concerning harvest management

strategies; e.g., half day vs. all day hunting, large daily harvests in relatively short periods vs. small daily harvests spread out over a longer interval.

To address this range of management questions, biologists from several conservation areas with active dove shooting management programs met in July, 1999 to develop a long-term Adaptive Resource Management (ARM) effort; the program was expanded to include additional areas in 2003 (Figure 20). The ARM process works best with management problems such as this one because the problem is small enough to explicitly define a management objective, and develop a meaningful and efficient monitoring program. Thus, the overall goal of the ARM program is to learn how different dove management strategies impact our objective of maximizing dove hunting opportunities on public areas. As a part of the monitoring program, dove hunters on these areas are required to report the number of doves killed, shots fired, hours hunted, zip code (to obtain an estimate of distance traveled to hunt), and number of doves shot but not retrieved; an orange-colored daily hunting card is used by dove hunters on these areas to help collect the necessary monitoring information.

To monitor our success in meeting our objective, we are collecting information on various harvest related metrics (Tables 3–6; Figures 7–11). For example, 71.1% of dove hunters went hunting once during September 2012, 19.3% went twice, and 5.9% went three times (Table 5). Average data during 1998–2012 showed considerable variation among participating areas (Figure 7) for number of hunts (or hunters; Figure 8), hours hunted (Figure 9), shots fired (Figure 10), and doves harvested (Figure 11). Also, most dove hunters traveled a median distance of 0–48.9 miles to hunt doves (Table 6).

It is important to note that the few areas involved in this long-term monitoring program represent just a few of the numerous mourning dove hunting opportunities on public areas found in Missouri. The Department provides managed mourning dove hunting opportunities on approximately 5,000 acres located on 150 fields located on over 90 public conservation areas scattered around the state. Check the public web sometime after the middle of August to locate the managed areas near you (http://www.mdc.mo.gov/).

## MOURNING DOVE RESEARCH UPDATE

### National Pilot Banding Study

To improve future harvest management decisions at the national, regional, and statewide levels, population information is needed to make better informed decisions. Interim harvest management strategies have been approved using existing historical data to help make more informed harvest management decisions. Also, the national mourning dove banding program continues to obtain modern information on band reporting rates and harvest rates for use in the population models, which in turn will be used in making decisions about future changes in hunting regulations and harvest management strategies. To date, these efforts have received widespread support (e.g., flyway technical committees, flyway councils, joint flyway councils, and the AFWA subcommittees and its working groups).

Missouri is banding doves on 16 areas, and attaching bands to 2,500–3,200 birds annually. During 2004–2012, the number of mourning doves banded in Missouri ranged from 1,486 in 2012 to 3,170 in 2010, and total of 22,955 doves banded (Table 7). During 2004–2012, the number of all recoveries from doves banded in Missouri ranged from 193 in 2010 to 373 in 2008; during the

same period there were 2,624 (11.4%) recoveries resulting from doves banded in Missouri. Of those recoveries, 2,422 (92.3%) were recovered in Missouri (Table 7). In addition to being recovered in Missouri, doves banded in Missouri were recovered in 15 other states plus Mexico. For doves recovered in Missouri, most (97.6%) were banded within the State; the remaining recoveries were banded in 11 other states (Table 8). Graphical representations of band recoveries through 2012 are provided (Figures 21, 22).

Hunters that shoot and retrieve banded birds are asked to call **1-800-327-BAND (2263)** or report the band online (http://www.reportband.gov/). Hunters will be asked by the operator to provide the band number, the location where the bird was killed, and the date when the bird was killed. By reporting band numbers dove hunters will be helping to manage our dove resource for future generations.

**Wing Survey and Recruitment**

The National Dove Plan recognizes the need for mourning dove recruitment information. Recruitment indices for other migratory game birds are obtained from wing collections conducted by national mail surveys conducted by the USFWS. A 3-year study, therefore, was initiated in 2007 to collect samples of wings using the 2 different collection methods, compare state-level and management unit-level estimates of age ratios derived from the 2 methods, and provide a cost comparison. The results of this project demonstrated the national mail survey provided an efficient and cost effective survey of dove wings. Other work has been accomplished at Iowa State University to correct for unknown aged wings. The national survey has now become operational and all of the wings (approx. 50,000) are processed and scored annually at the central location of the James A. Reed Memorial Wildlife Area, near Kansas City, MO.

Sampling wings from check stations at Missouri managed dove hunting areas will continue in an effort to obtain estimates of statewide recruitment. In combination with banding data, age ratios from dove wings can be used to estimate recruitment on a more realistic basis compared to the traditional fashion of using corrected age-ratios from wings and assuming that adult males and females are equally abundant in the population. Long-term datasets are necessary for the estimators to work properly; we currently have approximately 6-7 years of data. This preliminary work will eventually lead to a peer-reviewed manuscript and recruitment estimates that will be used in a balance-equation population model for a more informed harvest management strategy.

Table 1. Estimates of the number of doves harvested, number of hunters, and days afield by state in the Central Management Unit (CMU; Figure 2) from the Migratory Game Bird Harvest Information Program (HIP) survey for the 2012 hunting season.

| | HARVEST | | HUNTERS | | DAYS | | SEASONAL HARVEST (Harvest/Hunter) | |
|---|---|---|---|---|---|---|---|---|
| **Arkansas** | 494,200 | (±30)[1] | 21,400 | (±22) | 57,600 | (±26) | 23.1 | (±37) |
| **Colorado** | 204,300 | (±26) | 17,000 | (±18) | 43,800 | (±26) | 12.0 | (±32) |
| **Iowa**[3] | | | | | | | | |
| **Kansas** | 244,800 | (±62) | 12,200 | (±39) | 49,100 | (±52) | 20.1 | (±73) |
| **Minnesota** | 65,400 | (±75) | 6,800 | (±52) | 21,600 | (±48) | 9.7 | (±91) |
| **Missouri** | 296,600 | (±81) | 23,800 | (±29) | 51,400 | (±50) | 12.4 | (±86) |
| **Montana** | 2,600 | (±161) | 200 | (±87) | 500 | (±120) | 13.3 | (±183) |
| **Nebraska** | 223,400 | (±20) | 13,200 | (±17) | 39,000 | (±17) | 16.9 | (±26) |
| **New Mexico** | 160,100 | (±17) | 9,000 | (±11) | 38,000 | (±17) | 17.8 | (±20) |
| **North Dakota** | 78,900 | (±37) | 4,900 | (±30) | 17,400 | (±36) | 16.0 | (±48) |
| **Oklahoma** | 349,700 | (±26) | 15,700 | (±14) | 49,200 | (±19) | 22.3 | (±30) |
| **South Dakota** | 65,500 | (±28) | 4,500 | (±22) | 14,700 | (±28) | 14.4 | (±36) |
| **Texas** | 4,150,800 | (±20) | 207,200 | (±13) | 720,200 | (±16) | 20.0 | (±24) |
| **Wyoming** | 25,300 | (±40) | 2,700 | (±32) | 6,300 | (±38) | 9.3 | (±51) |
| **CMU Total** | 6,361,600 | (±14) | 338,700[2] | | 1,108,700 | (±11) | | |

[1]This represents the 95% confidence interval expressed as percent of the point estimate.

[2]This total may be slightly exaggerated because some people may be counted more than once if they hunted in more than one state, and explains why there is no estimated confidence interval.

[3]No estimates for 2012 season available.

Table 2. Percent change of the 2013 Roadside Mourning Dove Survey relative to 2012, 5-year (2008–12), and 10-year (2003–12) averages by Zoogeographic regions (Figure 2(A)) and MDC Management Regions (Figure 2(B)). Numbers in parentheses after the region names are the number of counties within that region turning in a completed and returned survey route.

| Zoogeographic regions | 2013 Index[a] | 2-year (2012-2013) % change | 5-year (2008-2012) % change | 10-year (2003-2012) % change |
|---|---|---|---|---|
| Northwest Prairie (11) | 1.40 | -13.68 | -4.79 | -14.09 |
| Northern Riverbreaks (11) | 1.22 | -17.91 | -9.52 | -10.10 |
| Northeast Riverbreaks (18) | 1.03 | -16.39 | -22.68 | -24.68 |
| Western Prairie (12) | 1.64 | -6.21 | 1.79 | -2.51 |
| Western Ozark Border (13) | 1.25 | -18.98 | -9.77 | -18.75 |
| Ozark Plateau (24) | 0.88 | 20.00 | 31.23 | 27.07 |
| Northern and Eastern Ozark Border (12) | 1.01 | -27.28 | -6.65 | -0.14 |
| Mississippi Lowlands (7) | 5.02 | -42.71 | 28.25 | 47.88 |
| STATEWIDE (108) | 1.40 | -18.31 | 3.01 | 1.57 |

| MDC management regions | 2013 Index[a] | 2-year (2012-2013) % change | 5-year (2008-2012) % change | 10-year (2003-2012) % change |
|---|---|---|---|---|
| Northwest (19) | 1.39 | -10.01 | -2.23 | -8.88 |
| Northeast (13) | 1.01 | -21.63 | -18.04 | -20.56 |
| Kansas City (10) | 1.51 | -1.82 | 4.12 | -11.44 |
| Central (15) | 1.15 | -23.74 | -19.92 | -18.66 |
| St. Louis (6) | 0.56 | -33.40 | -31.99 | -25.43 |
| Southwest (17) | 1.42 | 0.30 | 9.92 | 4.55 |
| Ozark (12) | 0.78 | 12.29 | 24.17 | 20.11 |
| Southeast (16) | 2.64 | -36.22 | 24.19 | 39.72 |
| Statewide (108) | 1.40 | -18.31 | 3.01 | 1.57 |

[a]Survey index is equal to the number of mourning doves observed per mile.

Table 3. Dove harvest characteristics during September 2012 from conservation areas cooperating with an Adaptive Resource Management (ARM) program to evaluate the effects of different hunter and harvest management strategies on the goal of maximizing hunting opportunities[1].

| Area | Number of Hunters | Doves Killed | Shots Fired | Hours Hunted | Doves Shot and Not Retrieved |
|---|---|---|---|---|---|
| A. A. Busch CA | 418 | 359 | 2,402 | 1,181 | 77 |
| Bois D'Arc CA | 569 | 598 | 4,463 | 1,726 | 144 |
| Columbia Bottom CA | 858 | 2,455 | 12,135 | 3,125 | 320 |
| Eagle Bluffs CA | 103 | 86 | 1,020 | 249 | 13 |
| Franklin Island CA | 69 | 187 | 852 | 208 | 34 |
| Otter Slough CA | 132 | 579 | 2,483 | 375 | 37 |
| Pony Express CA | 334 | 856 | 5,144 | 1,137 | 95 |
| J. A. Reed Mem. WA | 813 | 3,195 | 16,202 | 2,540 | 466 |
| R. E. Talbot CA | 367 | 1,033 | 5,371 | 1,089 | 133 |
| Ten Mile Pond CA | 363 | 2,621 | 9,599 | 1,070 | 182 |
| Total for Participating Conservation Areas[1] | 4,026 | 11,969 | 59,671 | 12,700 | 1,501 |

[1]It is important to note that these areas represent just a few dove hunting opportunities on public areas, and are part of a long-term management experiment. The Department provides managed mourning dove hunting opportunities on approximately 5,000 acres located on 150 fields located on >90 public conservation areas.

Table 4. Managed shooting field characteristics and relative distribution of the harvest characteristics by relative field size, during 2012.

| Area Code | Area Name | 2012 # Acres | 2012 # Fields | Ave. Field Size | Doves Killed per Acre[1] | Hunters per Acre[2] | Shots per Acre[3] | Hours per Acre[4] |
|---|---|---|---|---|---|---|---|---|
| ABCA | August A Busch CA | 99.0 | 9 | 11.0 | 3.63 | 4.22 | 24.26 | 11.93 |
| BDCA | Bois D'Arc CA[5] | | | | | | | |
| CBCA | Columbia Bottoms CA | 185.6 | 22 | 8.4 | 13.23 | 4.62 | 65.38 | 16.84 |
| EBCA | Eagle Bluffs CA | 50.0 | 4 | 12.5 | 1.72 | 2.06 | 20.40 | 4.98 |
| FICA[5] | Franklin Island CA[5] | | | | | | | |
| OSCA | Otter Slough CA[5] | | | | | | | |
| PECA | Pony Express CA | 102.5 | 25 | 4.1 | 8.35 | 3.26 | 50.19 | 11.09 |
| RMWA | James A Reed Mem. WA | 177.8 | 17 | 10.5 | 17.97 | 4.57 | 91.12 | 14.29 |
| TACA | Talbot CA | 94.5 | 21 | 4.5 | 10.93 | 3.88 | 56.84 | 11.52 |
| TMCA | Tem Mile Pond CA | 576 | 15 | 38.4 | 4.55 | 0.63 | 16.66 | 1.86 |
| All Areas | | 1285.4 | 114 | 11.3 | 9.31 | 3.13 | 46.42 | 9.88 |

[1]Represents doves killed per managed acre during the entire month of September.
[2]Represents the number of hunters per managed acre during the entire month of September.
[3]Represents shots per managed acre during the entire month of September.
[4]Represents the number of hours spent by hunters per managed acre during the entire month of September; all hours were rounded up the next whole number.
[5]Field information was not submitted for this area. Totals in this table do not include this area's harvest information.

Table 5. Number of hunting trips made by hunters estimated by matching conservation numbers throughout the month of September, 2012; e.g., we assume 181 hunters made one dove hunting trip on ABCA and 43 hunters made two trips, etc. Multiple trips may be over-estimated because some areas have hunters fill out another card when hunting different fields. Not all hunters provided a usable conservation number (see Table 4 for abbreviations of area names), therefore these are conservative estimates of the number of dove hunting trips during the month of September.

| # Days Hunted | ABCA | BDCA | CBCA | EBCA | FICA | OSCA | PECA | RMWA | TACA | TMCA | Total Hunters | % of Hunters |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 181 | 173 | 510 | 60 | 46 | 63 | 152 | 351 | 150 | 134 | 1820 | 71.09 |
| 2 | 43 | 70 | 91 | 11 | 7 | 18 | 51 | 104 | 56 | 43 | 494 | 19.30 |
| 3 | 14 | 31 | 25 | 1 | 1 | 8 | 16 | 30 | 16 | 8 | 150 | 5.86 |
| 4 | 12 | 9 | 5 | 1 | | 1 | 3 | 11 | 2 | 8 | 52 | 2.03 |
| 5 | 1 | 3 | 1 | | | | | 11 | 1 | 1 | 18 | 0.70 |
| 6 | 1 | 3 | 3 | | | | | 1 | 1 | 3 | 12 | 0.47 |
| 7 | | 1 | 1 | 1 | | | | 1 | | 1 | 5 | 0.20 |
| 8 | 1 | | | | | | | | | | 1 | 0.04 |
| 9 | | | | | | | | 1 | | | 1 | 0.04 |
| 10 | 1 | 1 | | | | | | | | 1 | 3 | 0.12 |
| 11 | | 1 | | | | | | | | 1 | 2 | 0.08 |
| 12 | | | | | | | | | | 1 | 1 | 0.04 |
| 13 | | | | | | | | | | | 0 | 0.00 |
| 14 | | | 1 | | | | | | | | 1 | 0.04 |
| **Total** | **254** | **292** | **637** | **74** | **54** | **90** | **222** | **510** | **226** | **201** | **2560** | **100** |

Table 6. Estimated distance traveled in miles to hunt doves calculated from zip codes provided by hunters and zip code for conservation area, during September 2012.

| Area Code | Area Name | N[1] | Mean | Min | Max | Q25 | Median (Q50) | Q75 |
|---|---|---|---|---|---|---|---|---|
| ABCA | August A Busch CA | 416 | 22.3 | 0.0 | 1,441.5 | 11.9 | 16.5 | 29.7 |
| BDCA | Bois D'Arc CA | 560 | 42.7 | 0.0 | 1,118.3 | 22.5 | 27.2 | 40.1 |
| CBCA | Columbia Bottoms CA | 854 | 32.1 | 0.0 | 246.9 | 17.5 | 30.9 | 40.8 |
| EBCA | Eagle Bluffs CA | 103 | 35.9 | 0.0 | 786.7 | 0.0 | 0.0 | 14.5 |
| FICA | Franklin Island CA | 68 | 31.6 | 0.0 | 136.2 | 13.6 | 28.1 | 46.4 |
| OSCA | Otter Slough CA | 131 | 43.8 | 0.0 | 376.1 | 22.9 | 25.1 | 55.2 |
| PECA | Pony Express CA | 333 | 39.4 | 0.0 | 259.9 | 24.8 | 31.5 | 45.8 |
| RMWA | James A Reed Mem. WA | 809 | 20.4 | 0.0 | 995.0 | 6.3 | 13.8 | 21.7 |
| TACA | Talbot CA | 362 | 43.6 | 10.0 | 501.0 | 27.9 | 38.3 | 52.8 |
| TMCA | Ten Mile Pond CA | 362 | 62.5 | 0.0 | 531.8 | 35.0 | 48.9 | 67.2 |

[1]Number of hunters providing a usable zip code.

[2]Q25, Q50, and Q75 represent the 1st, 2nd, and 3rd quartiles or percentiles of the data. For example, Q50 represents the middle value of distances traveled compared to the arithmetic mean that takes into account the far outside values.

Table 7. Recoveries of all mourning doves banded in Missouri and recovered in Missouri and elsewhere. For example, there was one dove banded in Missouri in 2012 that was recovered in Florida, and 256 doves banded in Missouri in 2011 that were recovered in Missouri. Note these data were last updated January 2013; data are continually added and revised by the USGS Bird Banding Lab.

| State Recovered | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | Grand Total |
|---|---|---|---|---|---|---|---|---|---|---|
| Alabama | | 1 | 1 | | | 1 | | | 1 | 4 |
| Arkansas | 3 | 1 | 1 | 1 | | 4 | 11 | 6 | 2 | 29 |
| Florida | | 1 | | | 2 | | 2 | | 1 | 6 |
| Idaho | | 1 | | | | | | | | 1 |
| Illinois | 2 | 2 | 7 | 12 | 5 | 8 | 3 | 1 | 3 | 43 |
| Kansas | 3 | 3 | 1 | 3 | 2 | 4 | | 2 | | 18 |
| Kentucky | 2 | 1 | | 2 | 1 | 1 | 3 | | 1 | 11 |
| Louisiana | | 2 | | | 2 | 4 | 2 | 2 | 1 | 13 |
| Mexico | 1 | | | 1 | 2 | 1 | 1 | 1 | | 7 |
| Mississippi | 2 | | 4 | 1 | 2 | | 1 | 1 | | 11 |
| Missouri | 236 | 261 | 335 | 265 | 351 | 287 | 248 | 256 | 183 | 2422 |
| Oklahoma | | | 1 | 1 | | 1 | | | | 3 |
| South Carolina | 1 | | 1 | | 1 | | | | | 3 |
| South Dakota | | | 1 | | | | | | | 1 |
| Tennessee | | 2 | 2 | 2 | 2 | 2 | 3 | 1 | | 14 |
| Texas | 4 | 9 | 4 | 4 | 3 | 4 | 3 | 5 | 1 | 37 |
| Utah | | | 1 | | | | | | | 1 |
| **Grand Total** | **254** | **284** | **359** | **292** | **373** | **317** | **277** | **275** | **193** | **2,624** |
| **Total Doves Banded in Missouri** | **2,358** | **1,899** | **2,723** | **2,140** | **2,778** | **2,937** | **3,170** | **2,464** | **1,486** | **22,955** |

Table 8. Recoveries of mourning doves from only Missouri, that were banded in Missouri and elsewhere; e.g., four doves banded in Kansas in 2011 were recovered in Missouri, and in 2012, 183 doves banded in Missouri were recovered in Missouri. Most recoveries in Missouri are birds banded in Missouri.

| Banding State | 2004 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | Grand Total |
|---|---|---|---|---|---|---|---|---|---|---|
| Alabama | | | | 1 | | | | | | 1 |
| Georgia | | | 1 | | | | | | | 1 |
| Illinois | | | 4 | 3 | 1 | 3 | 3 | 1 | | 15 |
| Iowa | 4 | 3 | 2 | 2 | 2 | | 1 | | | 14 |
| Kansas | 3 | 2 | 4 | | 1 | 3 | 1 | 4 | 1 | 19 |
| Kentucky | | | | | 1 | | | 1 | | 2 |
| Louisiana | | | 1 | | | | | | | 1 |
| Missouri | 236 | 261 | 335 | 265 | 351 | 287 | 248 | 256 | 183 | 2422 |
| New York | | | | 1 | | | | | | 1 |
| Ohio | | | | | 1 | | | | | 1 |
| Oklahoma | | | | | 1 | 2 | | | | 3 |
| South Dakota | | | 1 | 1 | | | | | | 2 |
| **Grand Total** | **243** | **266** | **348** | **273** | **358** | **295** | **253** | **262** | **184** | **2,482** |

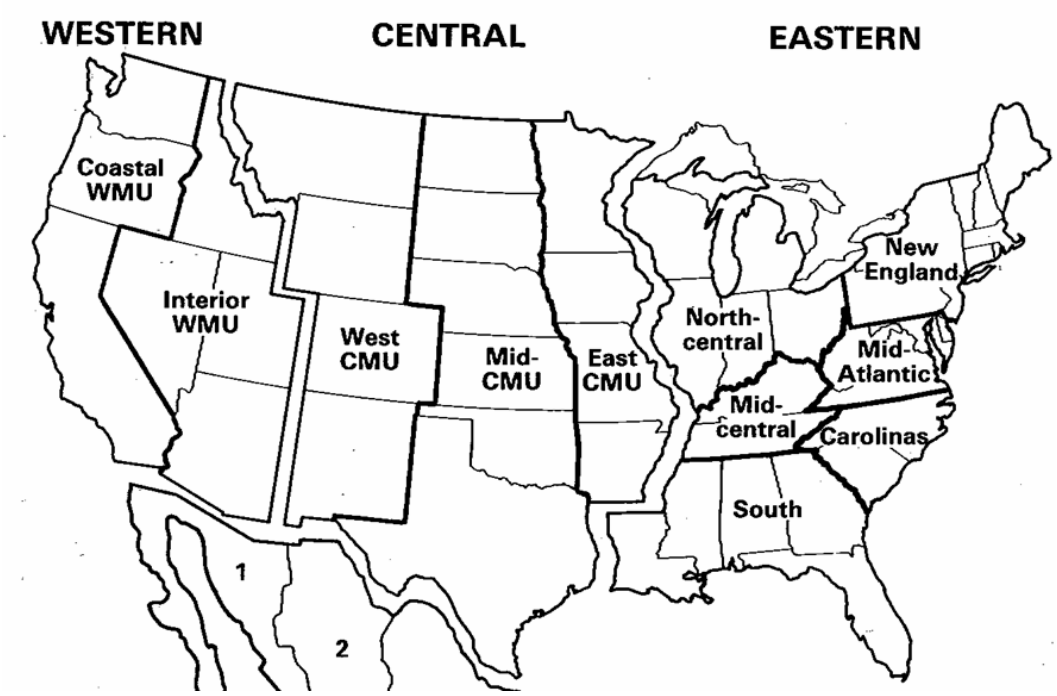
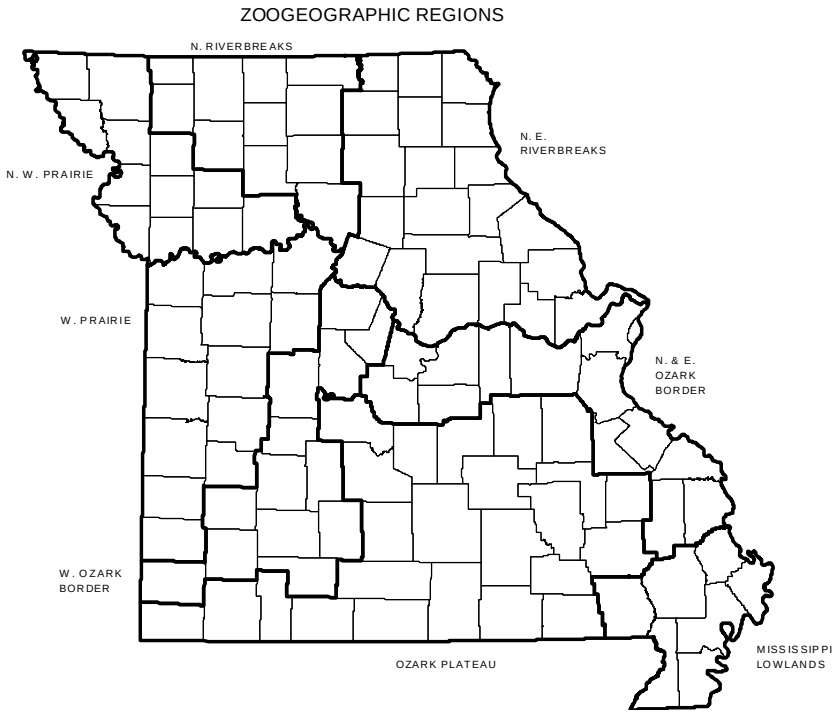
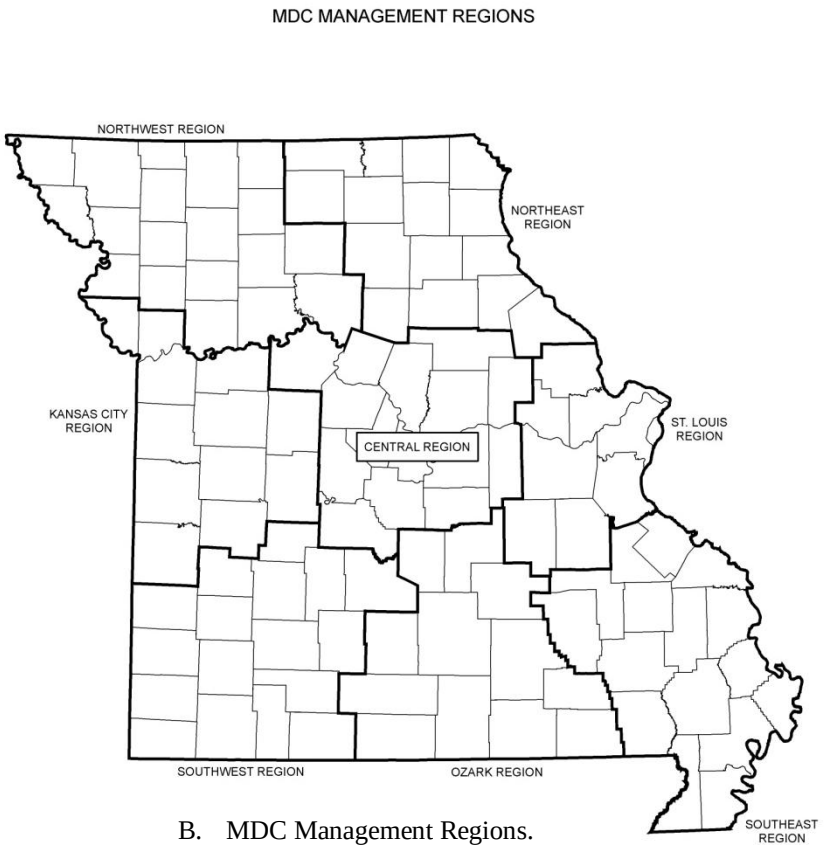



Figure 1. Within the United States, there are 3 zones, or management units, that contain mourning dove populations that are roughly independent of each other. These zones encompass the principle breeding, migration, and U.S. wintering areas for each population. Harvest management decisions are annually established by management unit. The Central Management Unit (CMU) consists of 14 states containing roughly 46% of the U.S. land area, and routinely has the highest Call-Count Survey (CCS) indices in the country.




A. Zoogeographic regions of Missouri.




B. MDC Management Regions.

Figure 2. Zoogeographic (A) and MDC Management (B) Regions in Missouri.

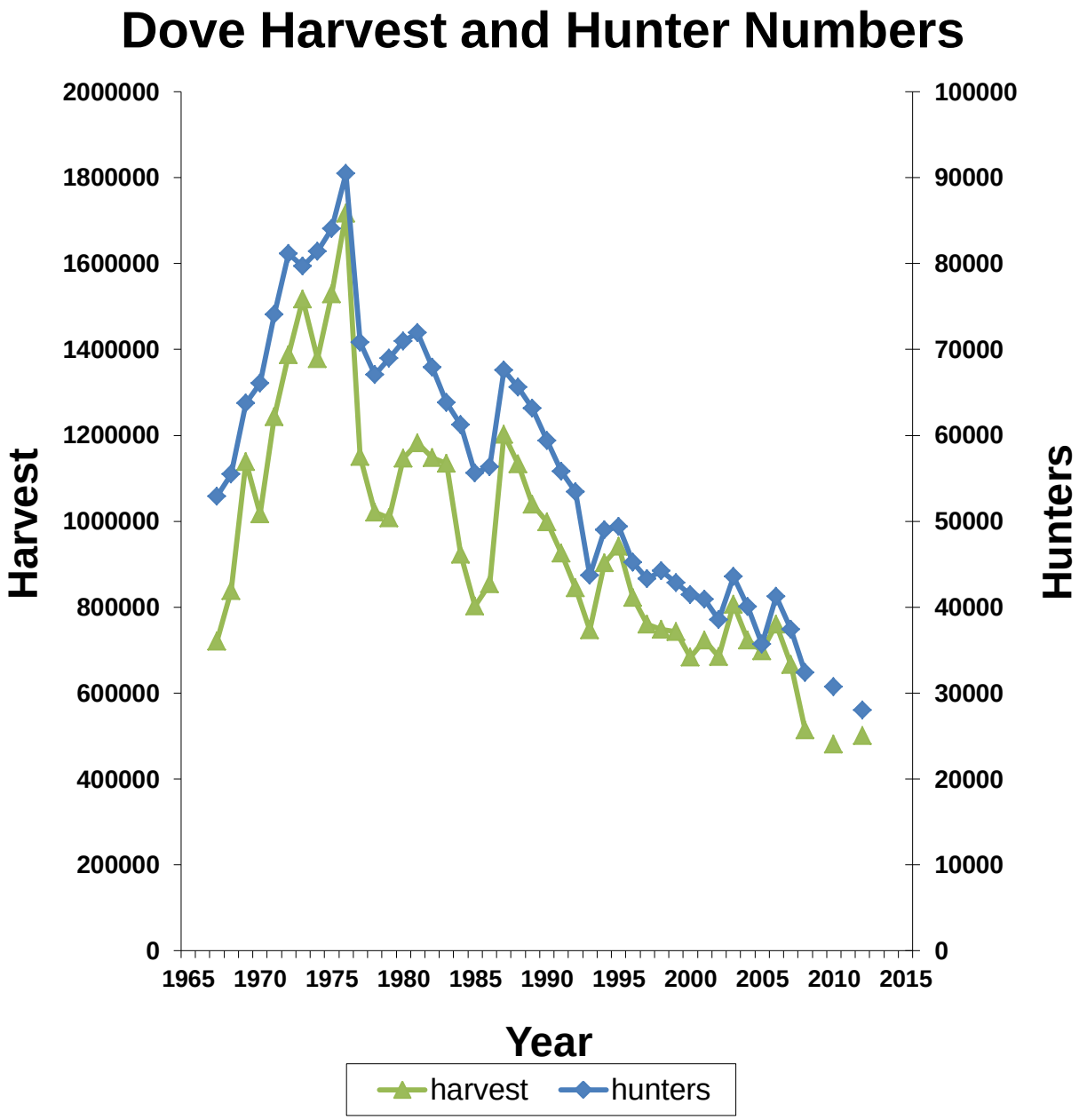



Figure 3. Long-term trends (1967– 2012) of mourning dove harvest and number of dove hunters in Missouri estimated annually by the small-game post-season harvest mail survey; note, starting in 2008 the small game hunter post-season harvest survey was conducted every-other year. Data through 2012 shown here, a survey was conducted in 2012.

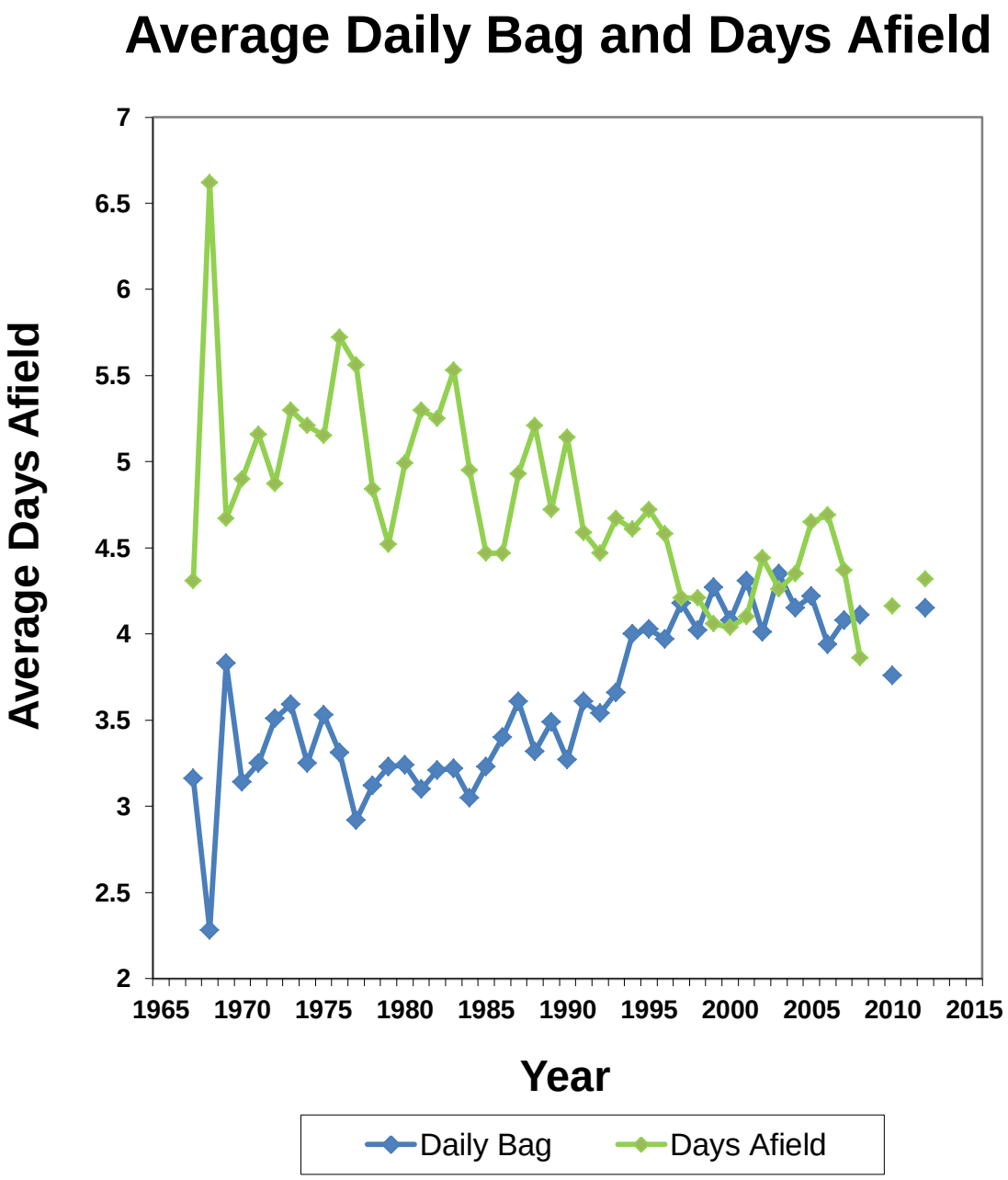



Figure 4. Long-term trends (1967–2012) of mourning dove average daily bag limit and average number of days afield for Missouri dove hunters estimated annually by the small-game post-season harvest mail survey; note, starting in 2008 the small game hunter post-season harvest survey was conducted every-other year. Data through 2012 shown here, a survey was conducted in 2012.

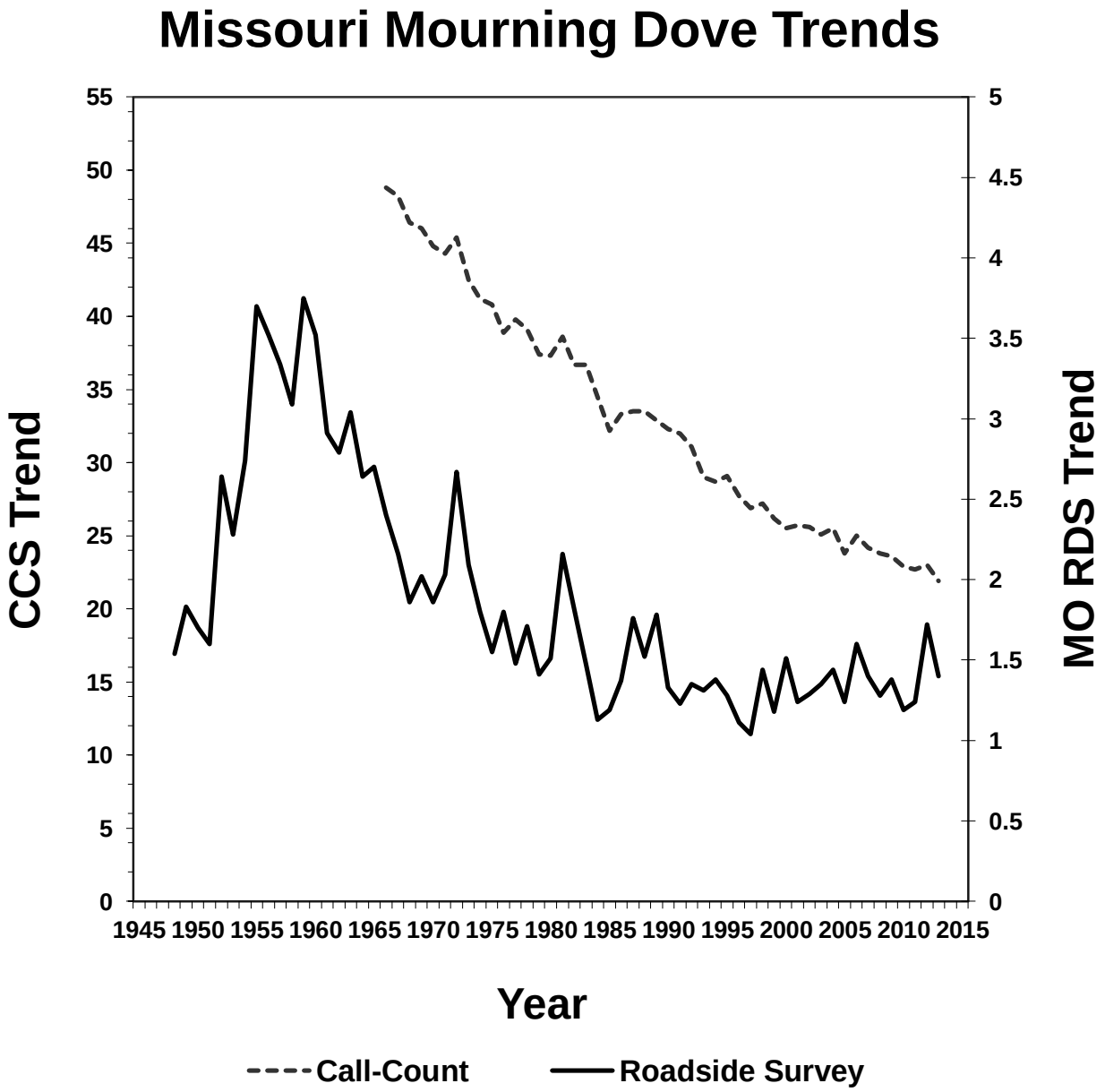



Figure 5. Missouri roadside mourning dove survey (RDS; doves observed along survey route) expressed as doves/mile (1947–2013) and U.S. Fish and Wildlife Service mourning dove call-count survey (CCS; doves heard calling) route regression trend analysis (1966–2013).

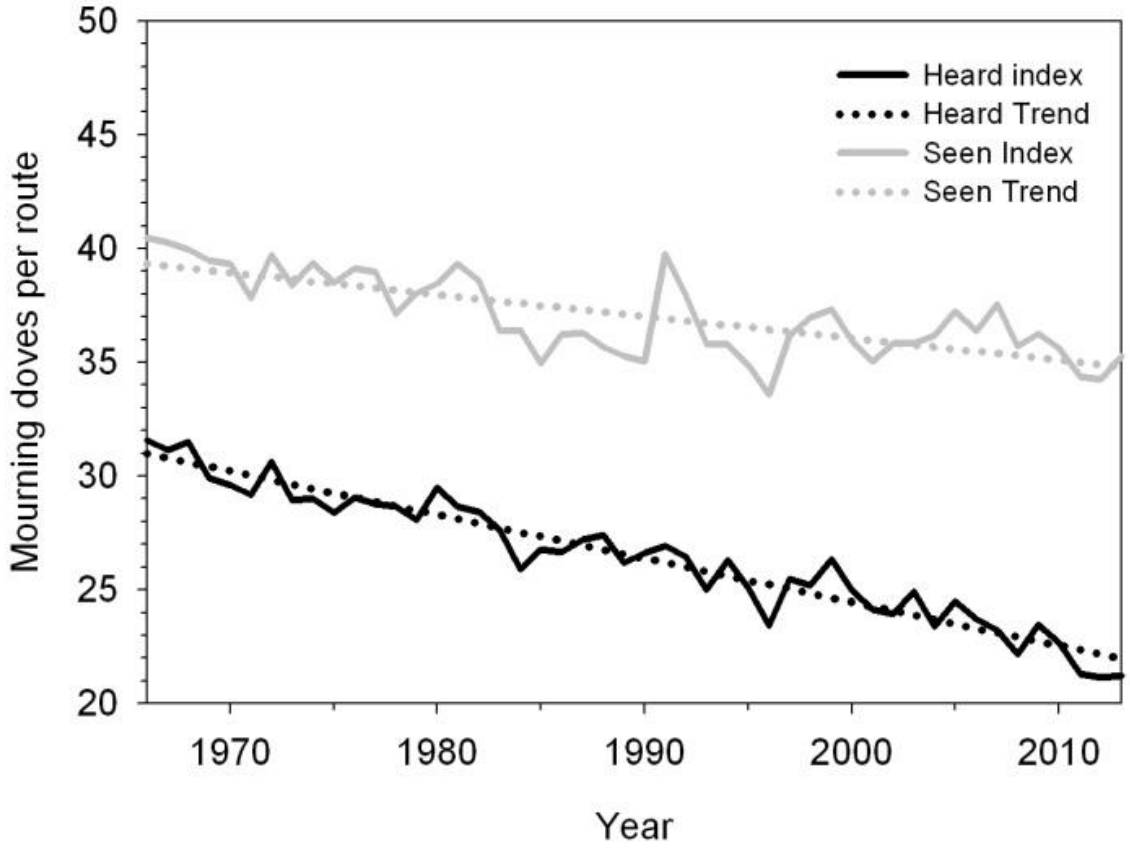



Figure 6. Call-Count Survey (CCS) trends in the Central Management Unit (CMU) of doves heard calling (heavy solid line) and doves observed (light solid line) for the Central Management Unit (CMU); from the USFWS 2013 Mourning Dove Status Report).

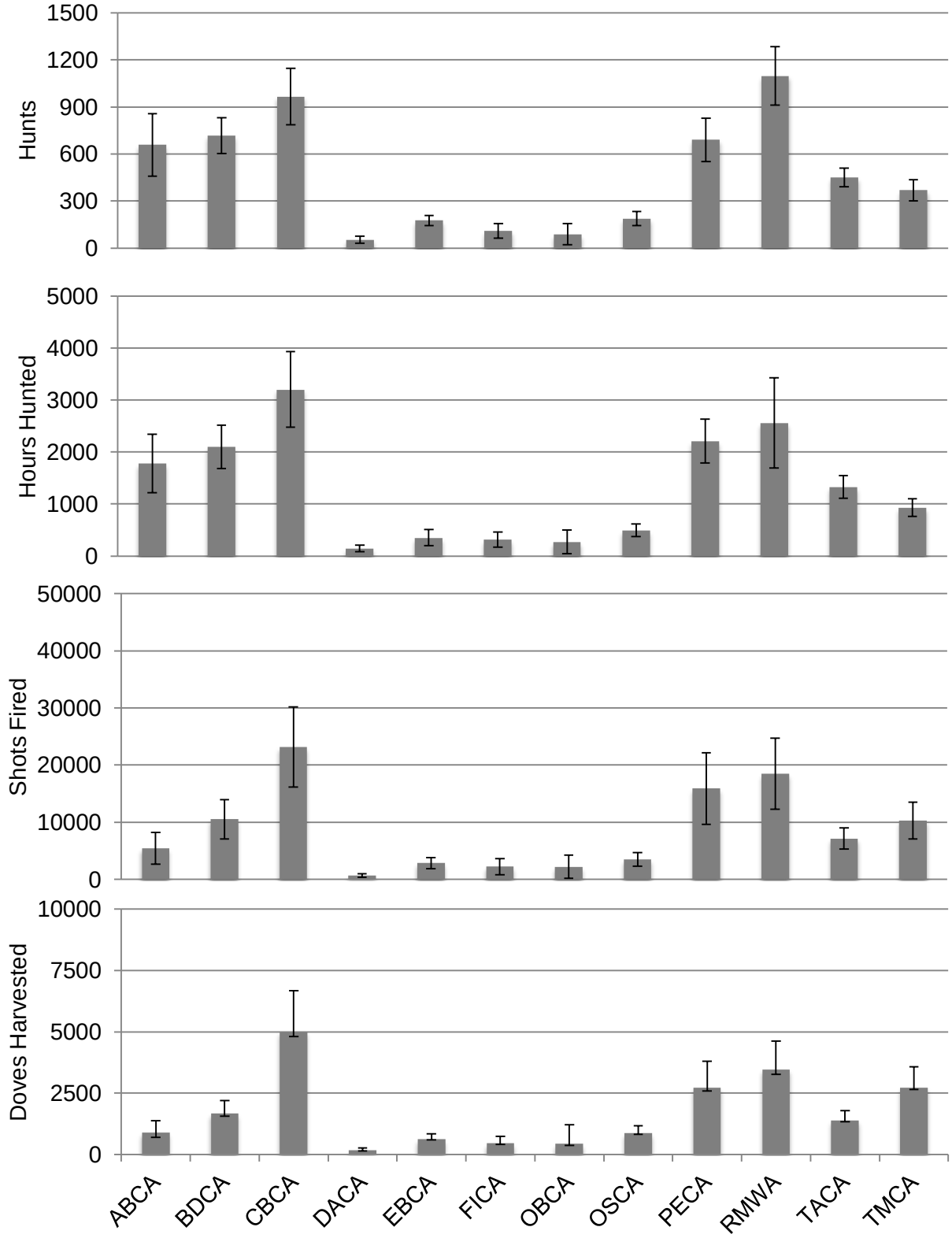



Figure 7. Average yearly total of hunts (or hunters), hours hunted, shots fired, and doves harvested (with 95% CIs shown with black lines) during September on MDC areas, 1998–2012 (see Tables 3 and 4 for acronym details).

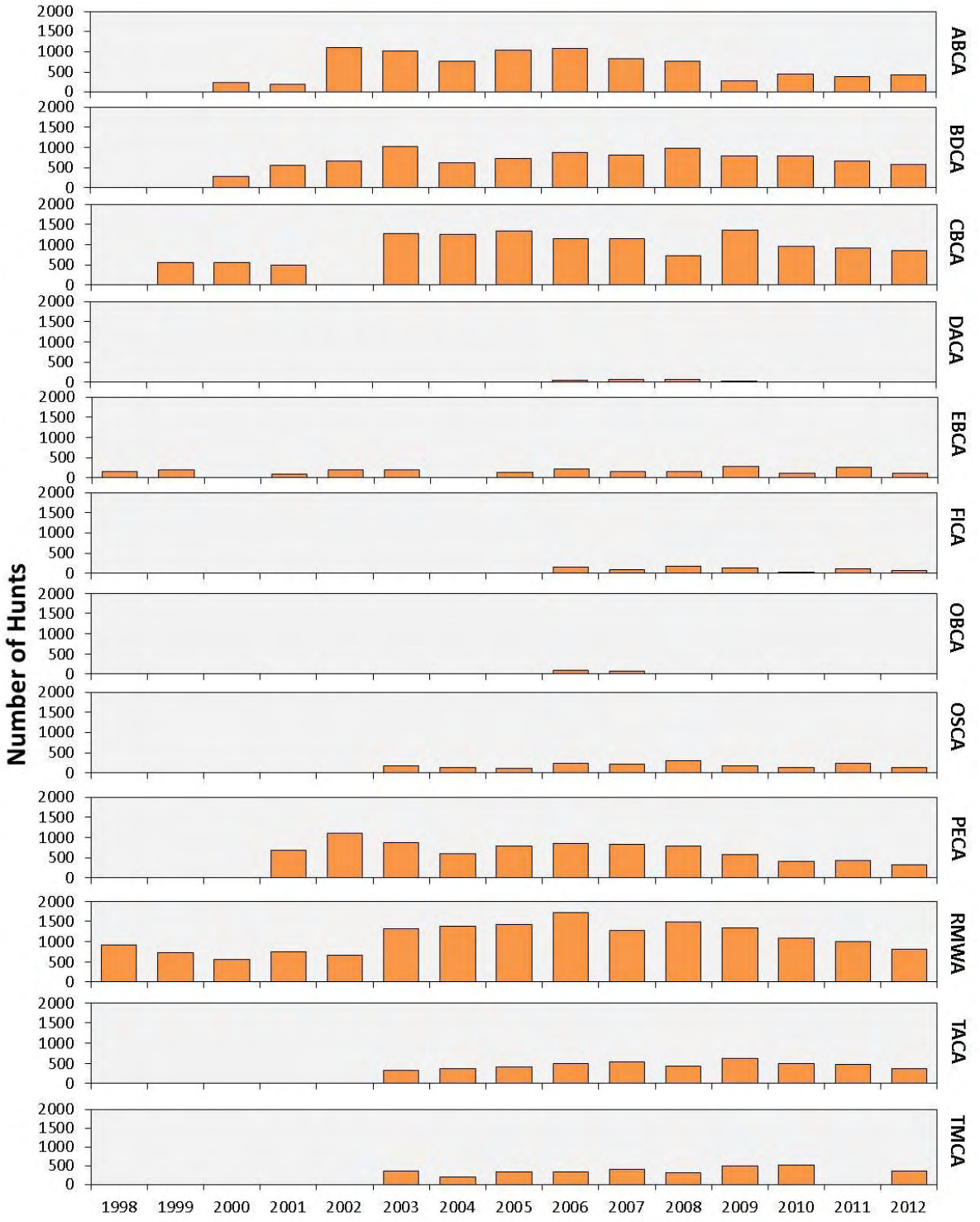



Figure 8. Yearly totals (through September) of the number of hunts (or hunters) on MDC areas from 1998–2012 (see Tables 3 and 4 for acronym details); we assumed that each card was a different hunter although some areas require a new card each time a hunter changes fields.

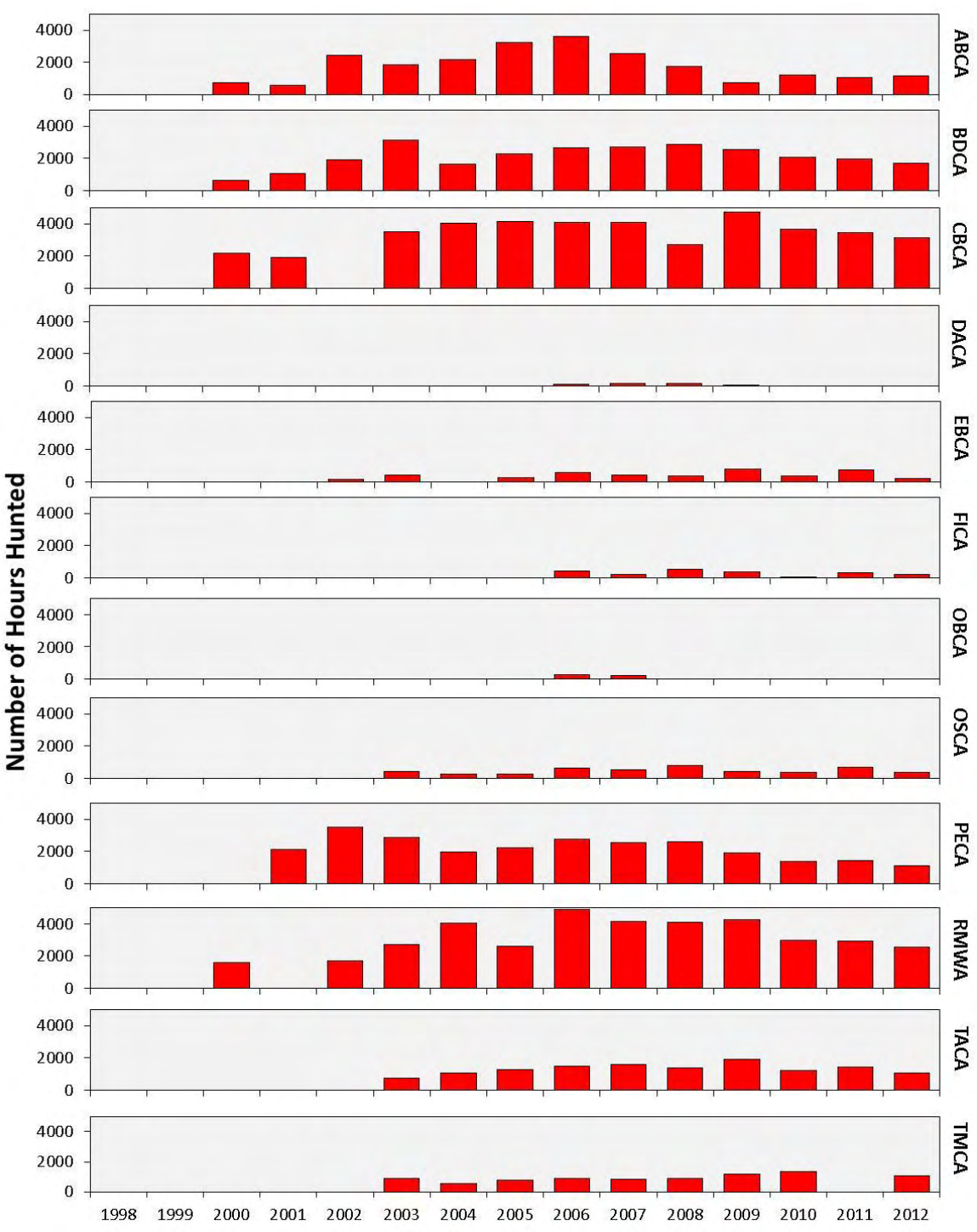



Figure 9. Yearly totals (through September) of the number of hours hunted on MDC areas from 1998–2012 (see Tables 3 and 4 for acronym details).

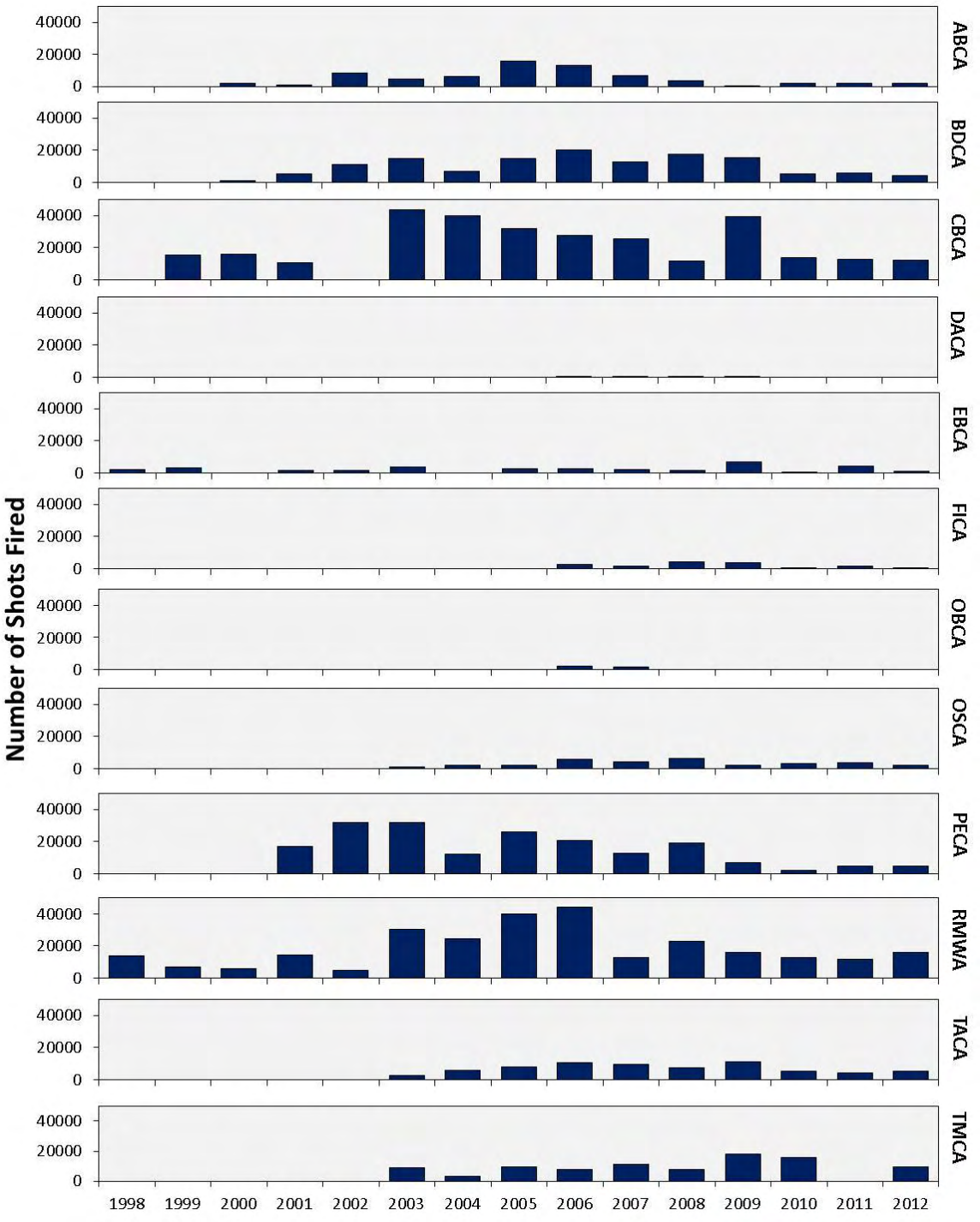



Figure 10. Yearly totals (through September) of the number of shots fired on MDC areas from 1998–2012 (see Tables 3 and 4 for acronym details).

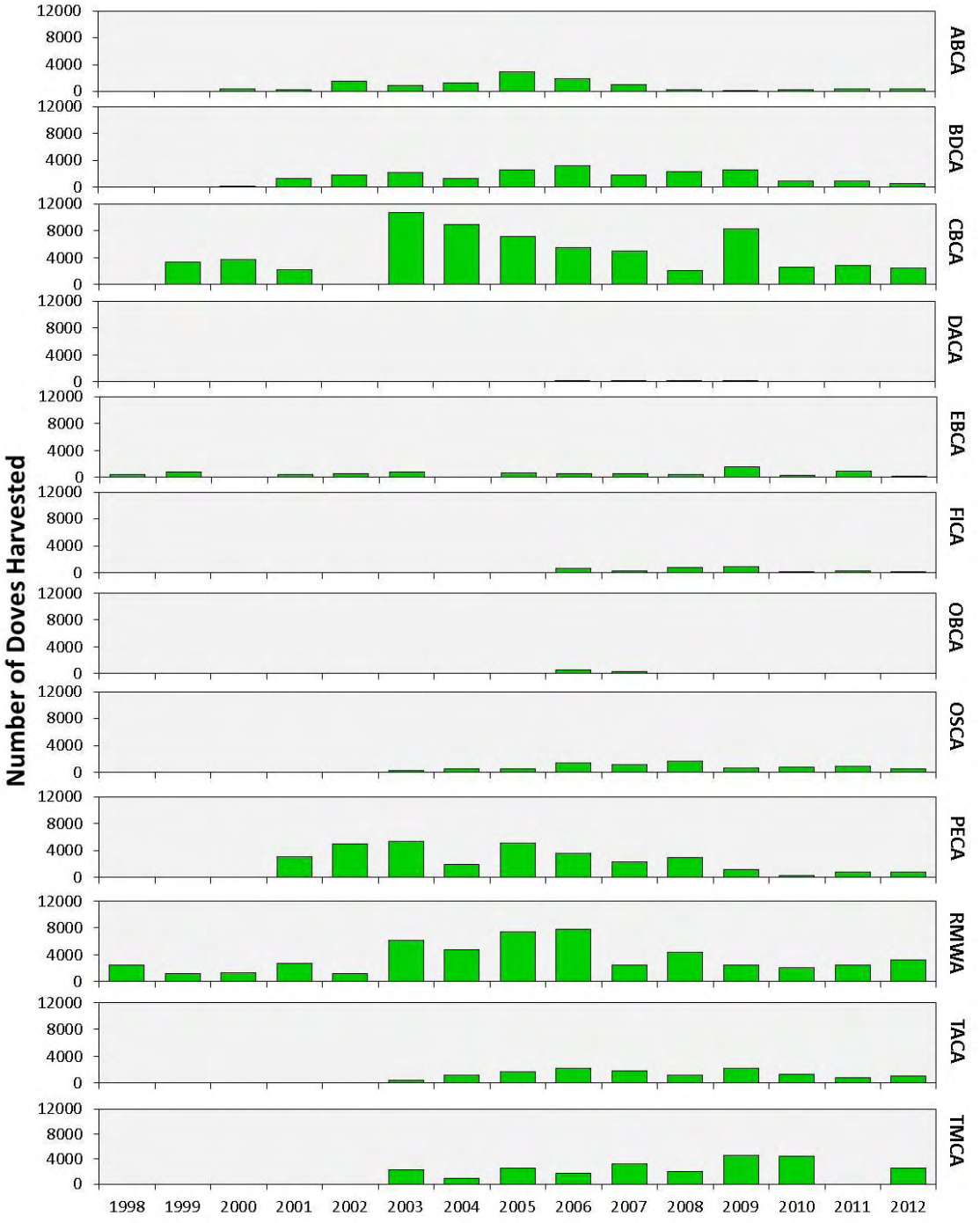



Figure 11. Yearly totals (through September) of the number of doves harvested on MDC areas from 1998–2012 (see Tables 3 and 4 for acronym details).

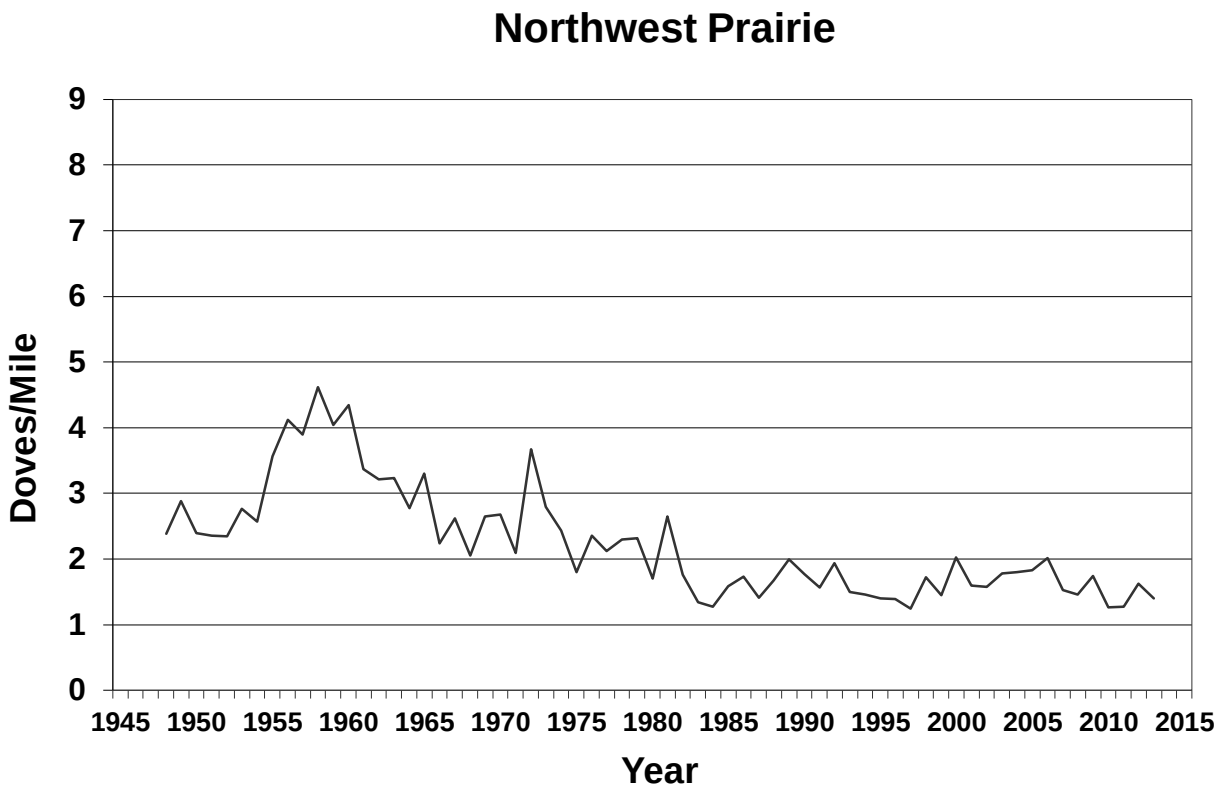



Figure 12. Missouri roadside dove survey index for the Northwest Prairie Zoogeographic Region (1948-2013).

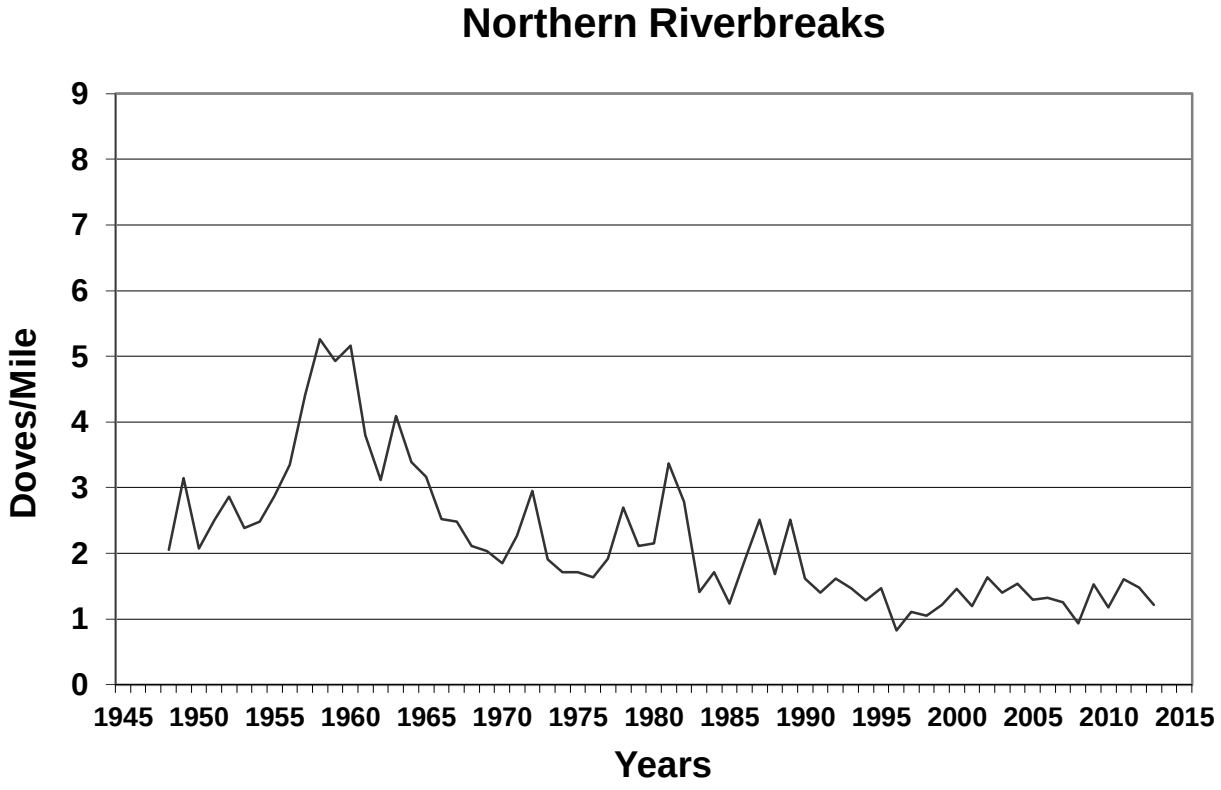



Figure 13. Missouri roadside dove survey index for the Northern Riverbreaks Zoogeographic Region (2948-2013).

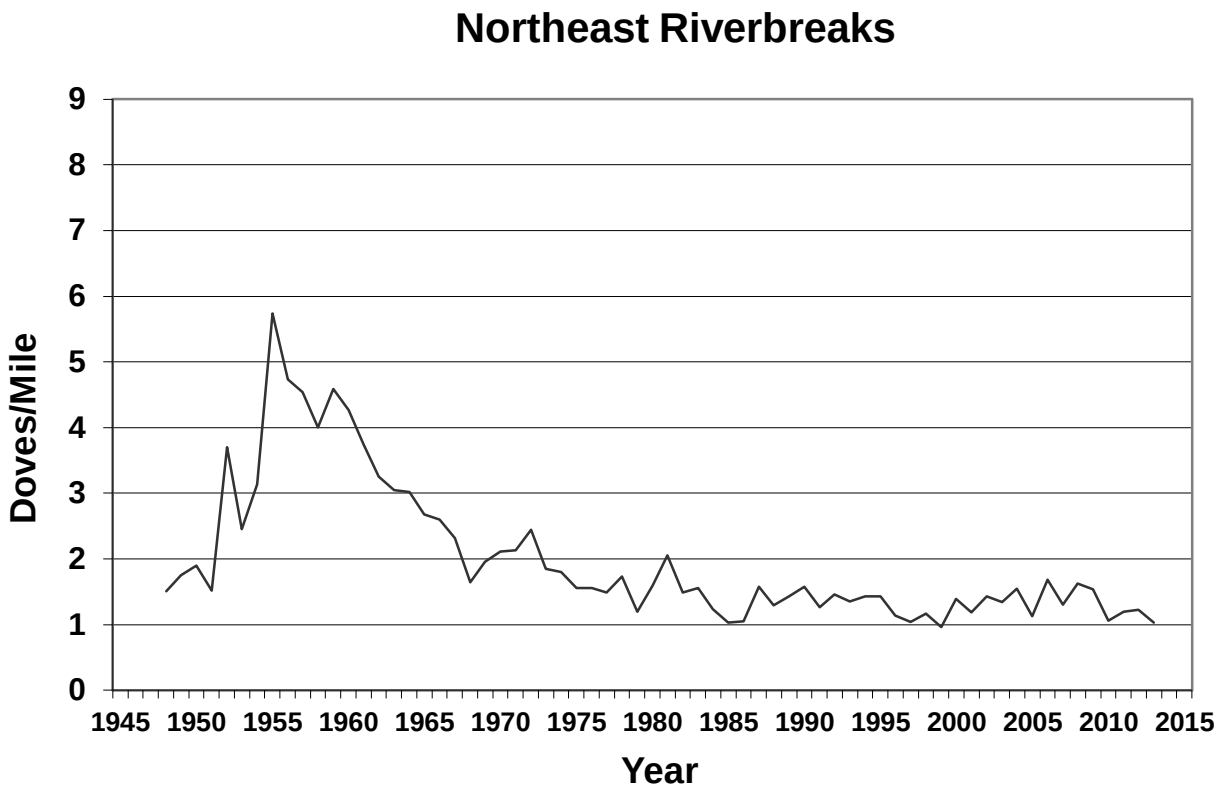



Figure 14. Missouri roadside dove survey index for the Northeast Riverbreaks Zoogeographic Region (1948-2013).

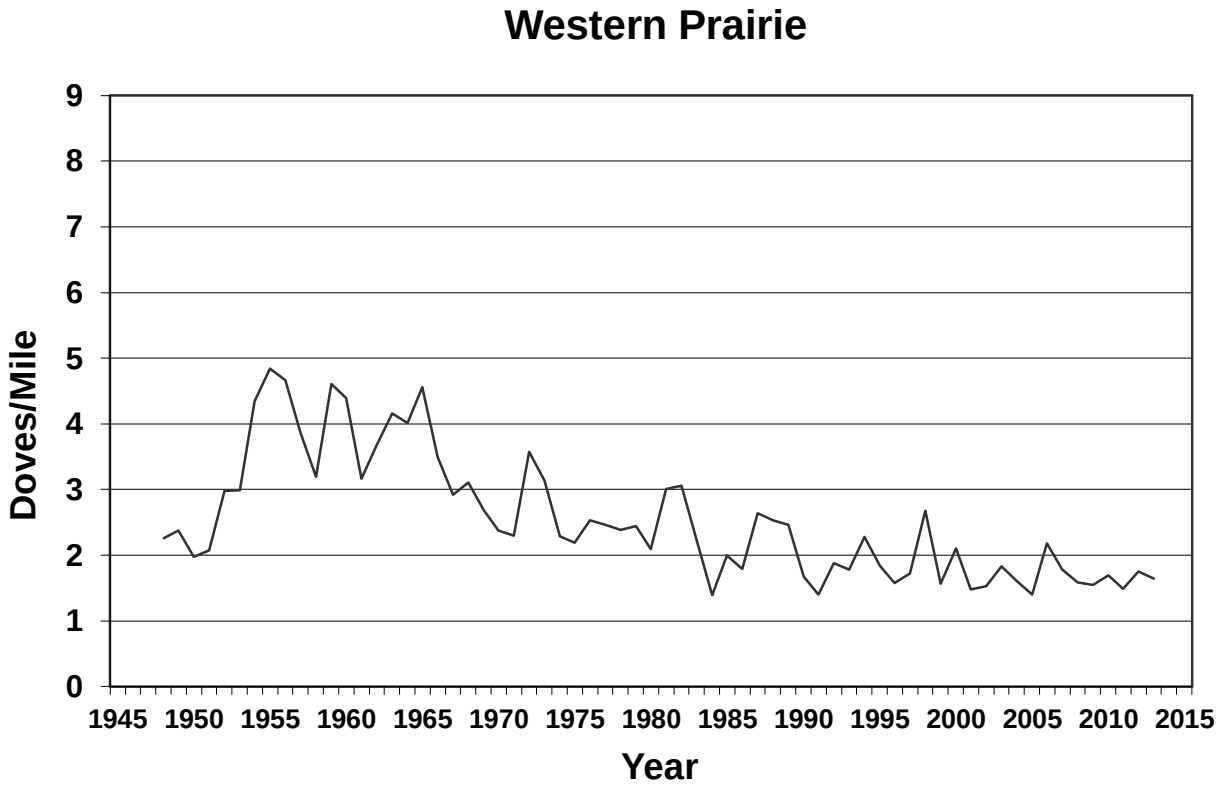



Figure 15. Missouri roadside dove survey index for the Western Prairie Zoogeographic Region (1948-2013).

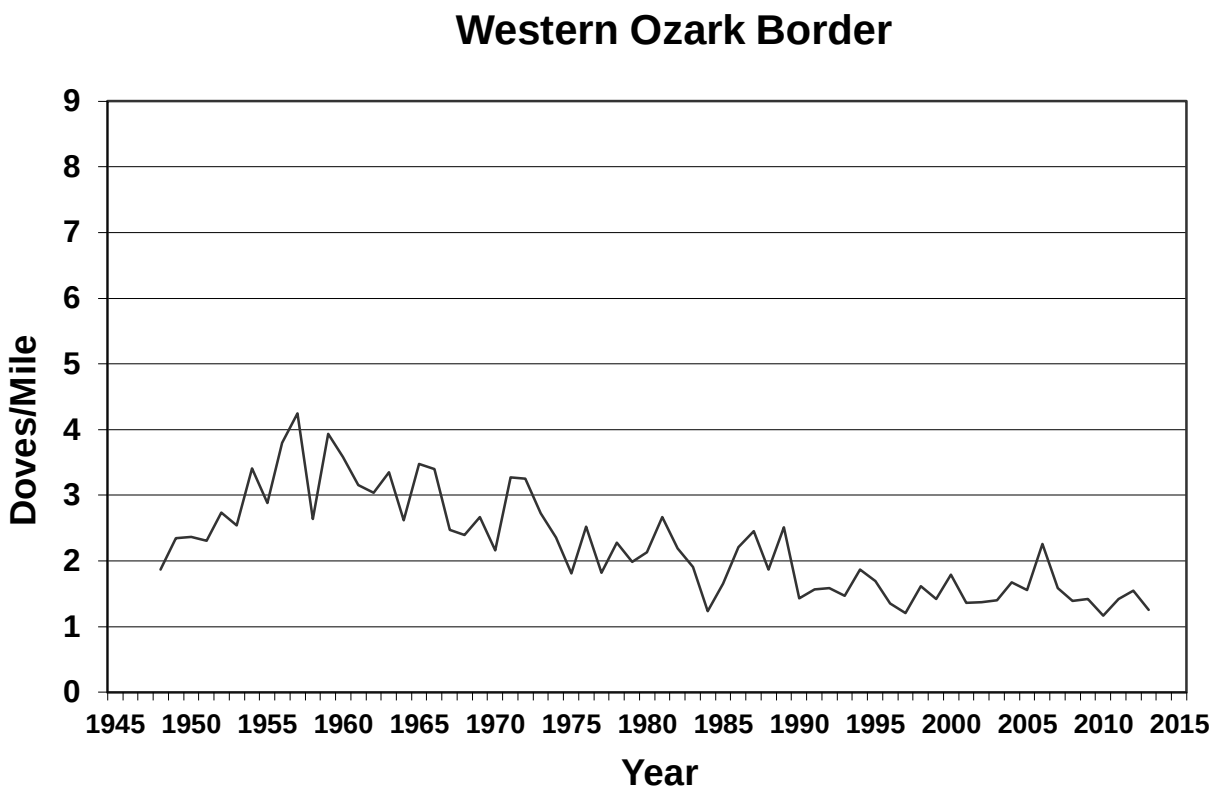



Figure 16. Missouri roadside dove survey index for the Western Ozark Border Zoogeographic Region (1948-2013).

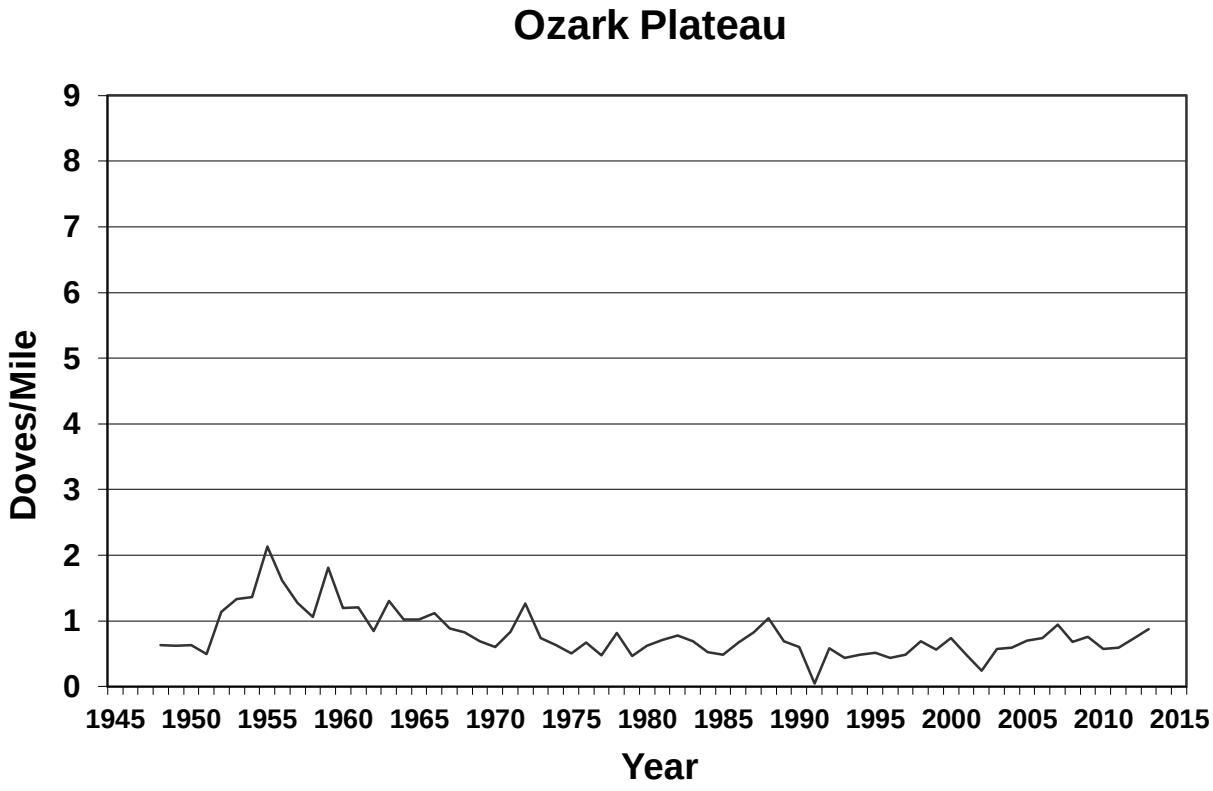



Figure 17. Missouri roadside dove survey index for the Ozark Plateau Zoogeographic Region (1948-2013).

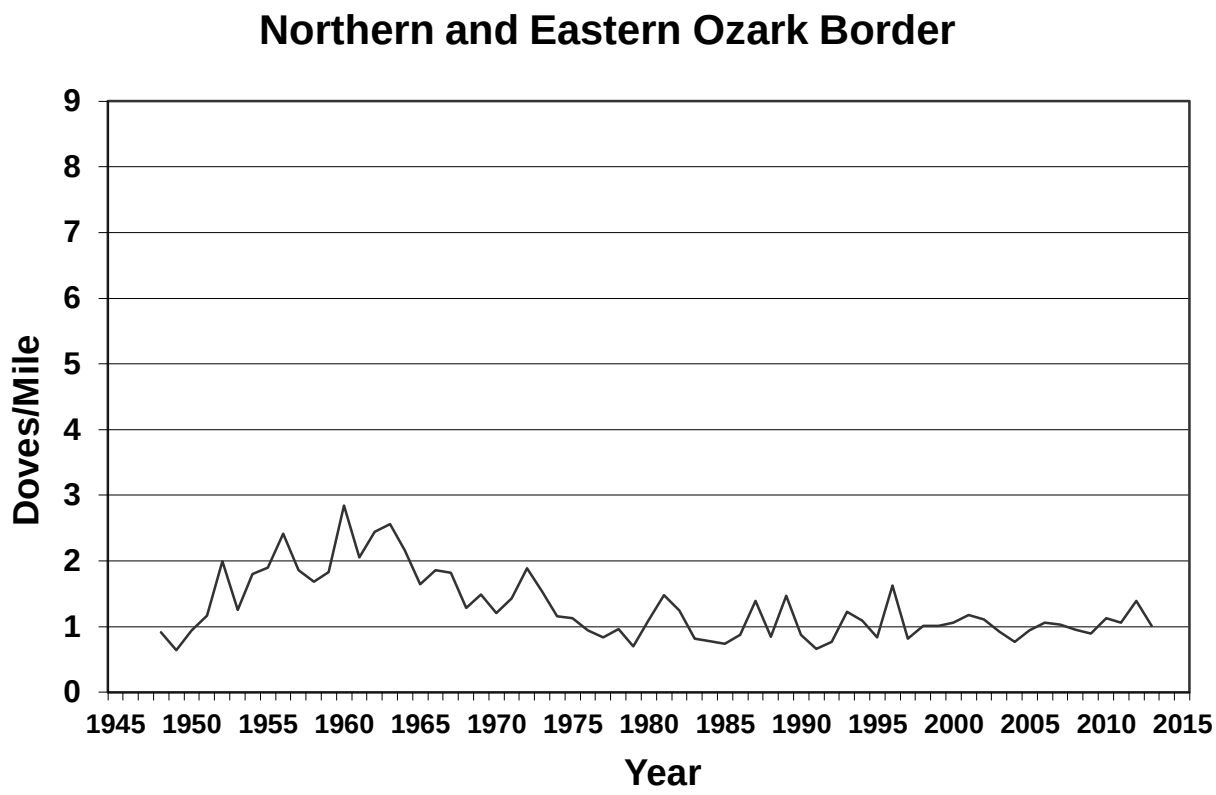



Figure 18. Missouri roadside dove survey index for the Northern and Eastern Ozark Border Zoogeographic Region (1948-2013).

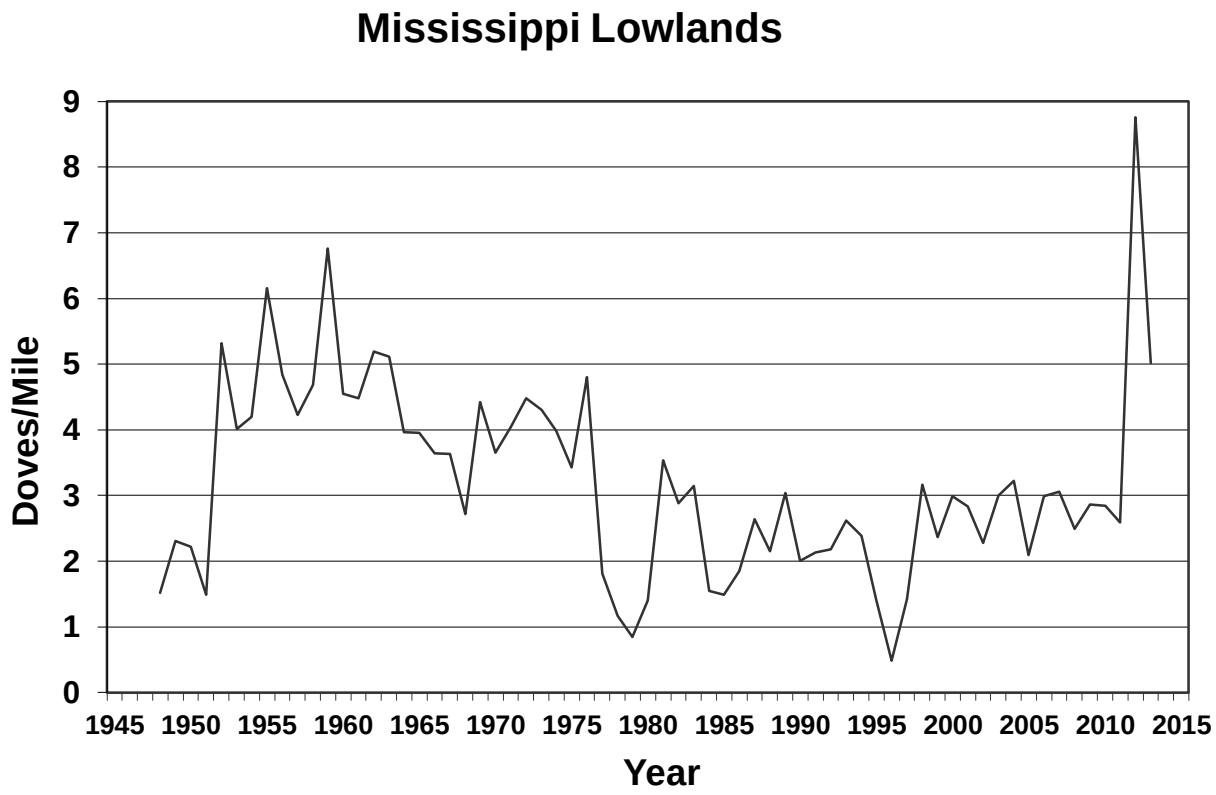



Figure 19. Missouri roadside dove survey index for the Mississippi Lowlands Zoogeographic Region (1948-2013).

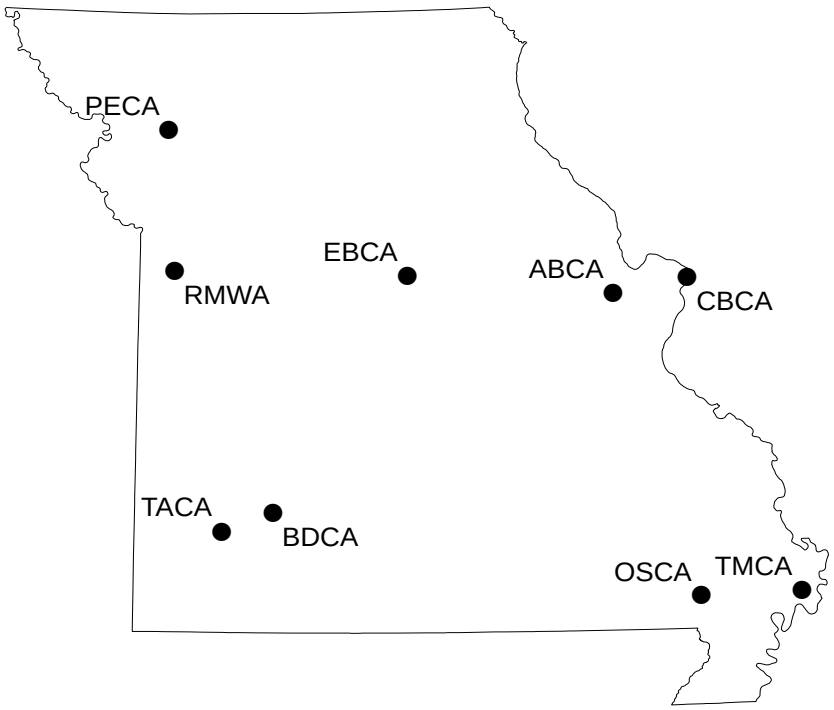



Figure 20. Locations of 9 public areas participating in mourning dove harvest management, 2005–2011; August A. Busch Conservation Area (ABCA), Bois D'Arc Conservation Area (BDCA), Columbia Bottom Conservation Area (CBCA), Eagle Bluffs Conservation Area (EBCA), Otter Slough Conservation Area (OSCA), Pony Express Conservation Area (PECA), James A. Reed Memorial Wildlife Area (RMWA), Robert E. Talbot Conservation Area (TACA), and Ten Mile Pond Conservation Area (TMCA).

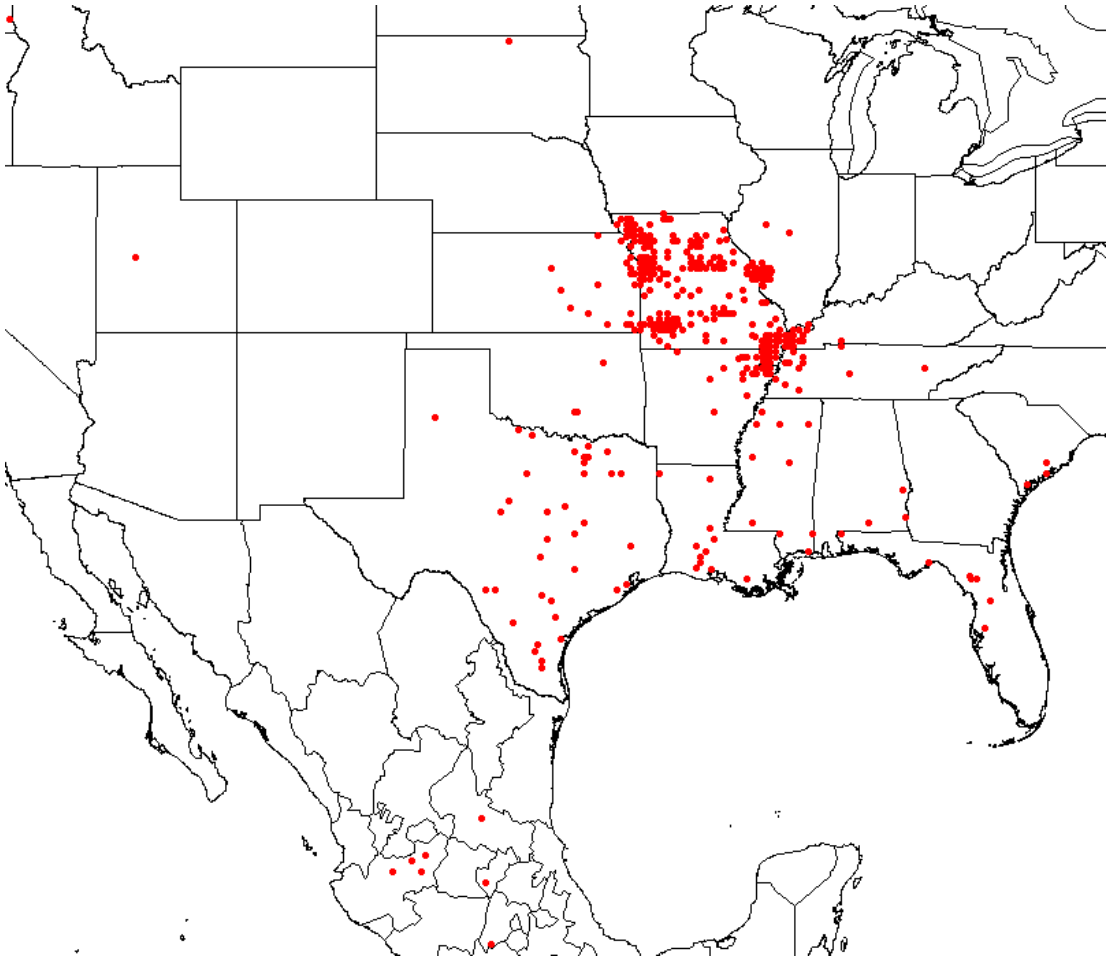


Figure 21. All recoveries for mourning doves banded in Missouri during the period 2004–2012. Red dots for recovery locations and blue dots for banding locations; some blue banding locations are covered with red recovery dots. Note the recoveries in northwestern Idaho, Utah, the Baja Peninsula, Mexico City area, Florida coast, and coastal South Carolina.

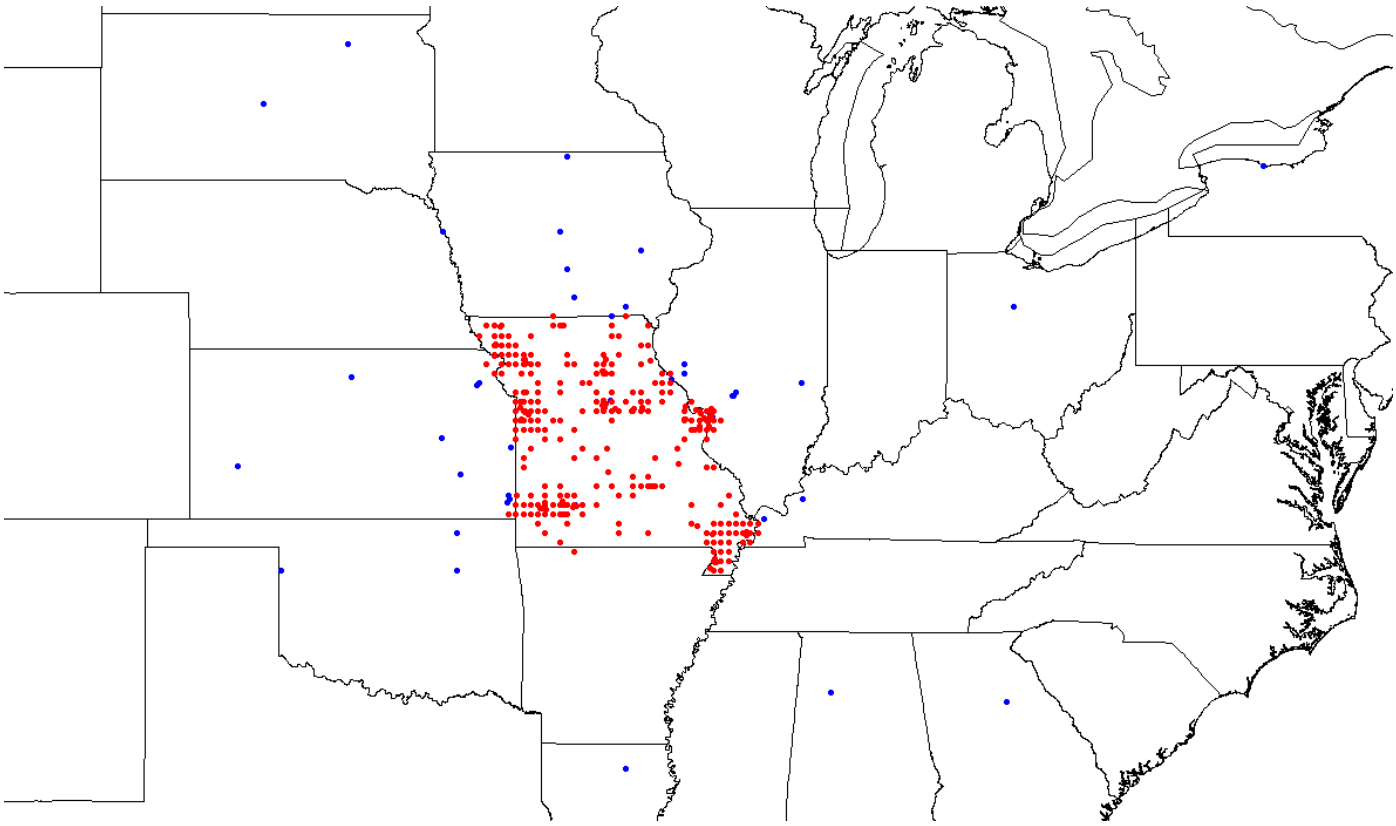


Figure 22. Recoveries only in Missouri of mourning doves banded in Missouri and elsewhere during 2004-2012. Red dots for recovery locations and blue dots for banding locations; some blue banding locations are covered with red recovery dots. Note the blue banding stations in western New York, central Ohio, northern Georgia, northern Louisiana and northeastern and central South Dakota.